THE AMERICAN GAS LIGHT JOURNAL

REDMAN & KENNY, N.Y.

PUBLISHING OFFICE No. 42 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, HEATING, MECHANICAL, CHEMICAL AND GENERAL SCIENCE.

VOLUME LXXXIII. No. 22. Whole No. 1,590. | NEW YORK, MONDAY, NOVEMBER 27, 1905. | $3 PER ANNUM, IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. C. E. SANDERSON, Manager. THOMAS J. CUNNINGHAM and ELBERT P. CALLENDER, Editors.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y., AS SECOND-CLASS MATTER.

Published on each Monday of the year, at No. 42 Pine Street, New York.

Telephone.—2996 John.

Terms of Subscription, Including Postage.—For the United States and Canada, $3 per annum. European countries, $5 (£1—25 francs).

Remittances should be made either by post office order, express money order, registered letter, or bank draft on New York, payable to the order of A. M. Callender & Co.

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The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

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[OFFICIAL NOTICE.]

Wrinkle Department, Western Gas Association.

WESTERN GAS ASSOCIATION,
OFFICE OF EDITOR, WRINKLE DEPARTMENT,
MILWAUKEE, WIS., Oct. 25, 1905.

To the Members of the Western Gas Association: The next meeting of the Western Gas Association will in all probability be the last one, owing to the proposed merging of the three leading gas associations. Therefore, every effort should be made to make it a rousing success in all respects, and it falls to my lot as Editor of the Wrinkle Department to again appeal to you for this department. I earnestly request those who have made promises of contributions to remember such as soon as possible, and I fully expect to hear from quite a number who have not made any promises, but who I know are in possession of something that would prove of value to the Wrinkle Department.

Yours very truly, B. MCADAM, Editor.

[NOTICE.]

Wrinkle Department, Ohio Gas Light Association.

OHIO GAS LIGHT ASSOCIATION,
OFFICE OF THE WRINKLE DEPT.,
719 CITIZENS BUILDING,
CLEVELAND, O., June 13, 1905.

The Wrinkle Department of the Ohio Gas Light Association is now ready to receive contributions for the 1906 collection, and a sketch or description of all devices, formulæ and methods of accomplishing objects pertaining to the gas business, is respectfully solicited.

Please send a written explanation, accompanied by any sketch, photograph or drawing, to the above address, or a description alone will suffice.

Hoping to receive prompt compliance,

Yours very truly, W. E. STEINWEDELL, Editor.

BRIEFLY TOLD.

THE NEXT MEETING OF THE OHIO GAS LIGHT ASSOCIATION.—It is a long way ahead, perhaps, to speak of the twenty-second annual meeting of the Ohio Gas Light Association, which will not be convened until March 21st of next year, but it goes that careful providers are those who arrange their work in time. Of such sort is Mr. T. C. Jones, the clever gentleman who, from behind the Secretary's desk and afield as well, looks after the Association's affairs, and it is to his courtesy that we are indebted for the following mention:

OHIO GAS LIGHT ASSOCIATION,
OFFICE OF SECRETARY,
DELAWARE, O., Nov. 20, 1905.

Dear JOURNAL: Just a word to let you know that we have started the work of preparing for our twenty-second annual meeting, which is

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to be held in Cincinnati, March 21st, 22d and 23d, 1906. One day last week I went to Cincinnati, and, with the kind assistance of Mr. James E. Stacey, we made a few preliminary arrangements. The Grand Hotel was selected as the headquarters, and they have a very good meeting room in the building. The hotel has recently been entirely refurnished, and I am sure our Association will be very comfortably housed. I, of course, saw Mr. Norman G. Kenan, President of the Cincinnati Gas and Electric Company, who was exceedingly courteous, and assured me that both he and his Company would do all in their power to make our meeting a success. Mr. Stacey will undoubtedly head the entertainment committee, which in itself is assurance that we will have a fine time. We have quite a number of papers promised, and I think our programme will be unusually attractive.

NOTES—

MR. E. A. BRADLEY, of New Haven, Conn., has resigned his position with the Bigelow Company in order to assume the duties of Treasurer to the Malden and Melrose (Mass.) Gas Light Company. His headquarters are in 84 State street, Boston.

AT the annual meeting of the shareholders in the Brooklyn Union Gas Company, of Brooklyn, N. Y., no change was made in the Board of Directors.

THE sale of the gas plant at Swedesboro, N. J., to Mr. Lewis Starr, of Woodbury, N. J., is reported.

THE Edison Company, at Santa Ana, Cal., is arranging to enlarge its gas plant.

THE semi-annual dividend of 3 per cent. on the shares of the American Gas Company, of Philadelphia, is payable the 1st prox.

MR. A. A. LOWE, of Philadelphia, Pa., says he is in earnest about putting in a gas plant in Trenton, Tenn., a franchise for which was recently granted him.

MR. JAMES T. LYNN and Associates have notified the residents of Portsmouth, O., that on and after December 15th the supply of artificial gas will be discontinued and thereafter natural gas will be supplied for all uses.

Electricity says that the extended use of electricity in mines gives rise to the belief that the dangers thereof are increased owing to the possibility of explosions caused by the heat from the lamp igniting the coal dust. This was demonstrated by a fire which took place at one of the collieries in the North of England some time ago. Investigations were then carried on by Mr. Hall, Inspector of Mines, who in a report states that in one case where a 16-candle power lamp was slightly covered with coal dust the temperature rose to 370° F. in 10 minutes, and that in another case the lamp exploded at 450° F. in 4 minutes, while a temperature as high as 650° was registered in a third case. Mr. Hall remarks that after the coal dust has been raised to a certain temperature spontaneous combustion commences.

THE ordinance proposing an opposition gas works for Norfolk, Va., which is known popularly under the title of the Fentress franchise, has been referred to a special committee of five from the Common and Select Councils—three from the former and two from the latter. The scheme of the Fentress franchise does not look especially inviting from the standpoint of getting a better lighting service for Norfolk.

A CORRESPONDENT in Bridgeport, Conn., writing under date of the 21st inst., incloses the following: "Mr. William H. Darbee, until last Saturday General Superintendent of the Connecticut Railway and Light Company, left the city to take up the duties of Engineer to the New York State Gas and Electric Commission. Last Friday the heads of the various divisions of the Company throughout the State, 30 in number, tendered Mr. Darbee a banquet at the Brooklawn Country Club. The officials arrived at the headquarters of the Company here Friday noon and went to Brooklawn in a special car. A delectable dinner was served, and a prolonged post-prandial session followed. The visitors made a number of short speeches, while Mr. Darbee expressed his pleasure at the splendid relations that have existed between the various officials since his connection with the Company. While the affair was tinged with a shade of regret at Mr. Darbee's departure, nevertheless extreme good fellowship prevailed, and the feeling of regret was mingled with hearty felicitations at Mr. Darbee's excellent future prospects. Leaving Brooklawn, the party went to Seaside Park, where the visitors spent some time, and later they inspected the power house on Seaside avenue."

Municipal Ownership.

[A paper read by MR. B. F. LYONS, of St. Louis, Mo., at the Thirty-third Annual Meeting, American Gas Light Association, Milwaukee, Wis., Oct. 18-20, 1905.]

In this age of industrial progress, commercial pursuit and centralization, we are ever on the alert for neutral developments, whether these changes be the result of combination of capital, growth of ideas or whimsical fancies it matters not; the fact still is potent that we are in the midst of events which require and must bring forth inquiry as to their inception, progress, stability and eventual success. These inspections must show whether they have been legitimately born and whether the principles involved will withstand the condition imposed upon them at present and in the future.

Municipal ownership of public utilities and natural monopolies has had the consideration of a *sect* for a long time past and is now being brought extensively before the general public as a political issue, having been nursed from its embryonic state to a matter of considerable importance by this sect, until it now commands the attention of entire communities. Whether this wave which is forming will continue to move, either for the betterment or to the detriment of the people collectively, lies wholly with the people.

Now that municipal ownership is before the people for consideration, it is for the people to decide what natural monopolies they can economically control, but no decision should be reached merely on the bare statement of men whose hobby and diversion it is to merely pass over these questions superficially, and who have drawn their conclusions from unsubstantiated reports. Furthermore, too much attention should not be given to the opinions of men who are not thoroughly conversant with the principles and details involved in the management and maintenance of the industry which they wish to municipalize. Strange to relate, the technical details which are often brought up for discussion and upon which *so much depends* in reaching the proper decision, are seldom thoroughly understood by the sponsors of the agitation. As the result of this wrong interpretation of the data under consideration, the matter is paraded under false colors, although no doubt the question is being handled in a conscientious manner, and consequently the public in general passes judgment very often detrimental to itself.

Monopoly.—That local gas industry must be monopolistic is not greatly disputed. Past experiences have conclusively demonstrated that competition has never effected the relief which the change contemplated, and that franchises granted to competing companies have in most cases brought on disastrous gas wars from which the consumers and public suffered. The object of bringing in competition was to secure cheaper and better service; the result was final combination of the competing companies with affairs left in about the same condition in which they previously existed, with the exception of a larger investment on which a dividend had to be earned.

In the instance of the city of London, England, we find that, in 1842, competing companies were chartered, the act of 1820 which prevented competition having been repealed. Six companies took advantage of this repeal, and in 1853, when competition was stopped by mutual agreement, there were 13 different and distinct companies competing in the same territory. London suffered by having its streets torn up continually, by having many different mains on the same street where one would have been sufficient, and from other attendant inconveniences, with the same usual outcome. By 1883 the competitors had so combined that the gas situation was under the control of 3 different companies, each of which kept in restricted territory, as is also the case to-day.

Franchise.—In order to permit their formation, protection must be afforded to investors in public service corporations, since their installations usually call for a large outlay of capital. This guarantee of protection usually takes the form of charters and franchises for an indefinite or limited period of time, and when granted has certain provisos concerning termination or renewal under particular conditions.

Inducements for investment depend upon the text of the franchises, and it is incumbent on the public to keep its promises, while the corporation must carry out its part of the agreement in good faith.

Gas franchises should be exclusive during the period they are in force, so as to guarantee the proper protection for the large investment, both against abnormal political exhortation and constantly changing public opinion. Many times the petty personal grievances are distorted until they are made to appear as a general evil, calling for immediate relief; these are hailed by the public-spirited Samaritan as the danger signal of an impending public calamity. His false con-

clusions are hastily proclaimed to his constituents, and it is against these hasty judgments that the investment should be protected.

The exclusive privilege permits of money being borrowed at a low rate of interest and decreases the liability of loss of the lender. All this works to the public's interest, and probably diminishes the tendency of over-capitalization, upon which extra capital the consumer is called upon to pay the interest.

The exclusive privilege and exemption from competition is often cited as one of the arguments in favor of municipal control, on the theory that these privileges, once granted to a corporation, are abused, the public not sharing the advantages gained by these conditions, while under municipal operations these benefits go directly to the consumer.

This is the popular belief, and perhaps in some cases it does work to the detriment of the people, but I think we can say that as a general thing the burden of proof rests with those who hold this belief. It can be said right here that if the public is to enjoy the results of economical private management, it is necessary that the privately controlled company be allowed the most advantageous conditions under which to operate, and it is positively necessary, in making fair comparisons of the two different systems, that both of them be allowed the means for the accomplishment of most favorable results.

Management.—The modern public service corporation is the result of a gradual growth and development from its crude form, when a few men in the same community co-operated to supply themselves with commodities for personal convenience, to its present form of a highly systematized and commercialized public servant. While in the beginning the manner of delivery, and in some cases the article itself, were considered luxuries, to-day we do not think of water, gas, electricity, and transportation facilities, as anything else but the necessities and conveniences which the progress of the world has called upon us to accept as such. Bearing this in mind it is evident that production by and management of the public service corporation require the skill and attention of trained specialists in order that the modern standards of facility, quality and cost be satisfied. Herein lies the advantage of privately controlled enterprises which are ever on the alert to find new principles and to apply them. We have but to look around and we can see that every large corporation has its corps of trained engineers, chemists and other specialists whose sole purpose is to determine upon things which will cheapen and better the construction and operation. Take for instance the large chemical and by-product works. Most of these firms have men whose object and duty it is to work on one single idea, no questions being asked as to the length of time it will take to accomplish this purpose. When their research has been finished the company is usually amply repaid for the expense by being able to manufacture this particular substance in commercial quantities, if that was the object of the investigation, or cheapen an already existing process, just as the case might have been.

There can be little doubt that expert and broad business principles of management are extremely necessary. Germany is developing the professional politican, or let us call him an administrative in distinction from a legislative officer, who holds his office as mayor for a long period of years in his own city, and is sometimes even called to manage affairs in other places. We can liken him to managers of incorporated bodies.

The question can be raised as to why we do not adopt such a plan in this country: the answer lies in the difference of our political systems. In our country the municipal officers are subject not only to their party's success, but pleasure, and although a man may have proven a successful officer in the true sense of the word, he may have invited the displeasure of the party leaders, thus terminating the career of a useful public servant, while his party was again successful. The German mayor is appointed to hold office during successful administration, and is not subject to so many political influences.

Now, what is true of our mayoralty holds good for the experts of various departments of our municipalities, and I would like to ask how many successful and energetic engineers would be willing to leave a good position to risk their chances in the hands of a political machine. This can best be answered by yourselves, but the opinion can be ventured that but very few would select a berth where such instability exists.

At the present time the local supply of available expert men for municipal works is limited, and this, too, complicates the selection of the proper head, which usually ends in the choice of a non-resident. What we lack now in this country, and will want until our political systems are changed, is a corps of experts who are willing to forsake private life for public service in expert capacities.

Politics.—Still stronger political machines than now exist will most naturally result from municipalization, and the opinion of no less an authority than Mr. James Dalrymple, the Scottish Tramways expert in this particular, is worthy of note. Mr. Dalrymple says:

"To put street railroads, gas works, telephone companies, etc., under municipal ownership would be to create a political machine in every large city that would be simply impregnable. The political machines are already strong enough with their control of policemen, firemen, and other offie holders.

"If in addition to this, they could control the thousands of men employed in the great public utility corporations, the political machines would have a power that could not be overthrown.

"I came to this country a believer in public ownership. What I have seen here, and I have studied the situation carefully, makes me realize that private ownership under proper conditions is far best for the citizen of American cities."

The argument of direct spoils and dishonesty has been used by one system against the other, and although these conditions have prevailed in the past, it is hoped that our present and future undertakings will be freed from all except pure business principles.

Policies.—Are the policies of municipal gas boards as broad and comprehensive as those of the privately controlled companies? In comparing the condition of affairs in Philadelphia which existed before the present private management went into control and under the present system, one at once notices the different policies which were in vogue.

Under the old system the works were allowed to run down, the mains were of inadequate size for proper supply, and were in very poor condition, as were also the services, which were rusted out, clogged, etc. Some $1,500,000 was expended in the past 4 years of municipal control, while the present management expended in about 8 years of its regime $10,500,000 in order to put the entire system into better shape, so that economical results could be accomplished; about 80,000 services have been renewed by the present Company, which in a measure will indicate what was left undone by the Bureau of Gas, although they realized the urgent necessity of so doing, as can be seen from their reports which cover the case as follows:

"Thousands of worn-out service pipes could not be renewed during the year because no money was available."

The former represents a policy of expenditures simply large enough to keep things going in a slipshod manner; the latter represents the business policy of rehabilitating, extending and branching out for future requirements, which, of course, means a substantial system and one which will pay dividends.

Wheeling, W. Va., is another example of decline under municipal control. Little or no main has been laid since 1885, no effort is made to get new business, and only repairs which are absolutely necessary to keep things going are made, and the entire system is rapidly going to decay.

It might be well enough to assume that efforts to secure the best possible results are made by the governing bodies of municipal plants, but the question arises whether immediate or ultimate results are what they seek to bring about.

In securing immediate returns the future is ofttimes overlooked, and when of necessity extensive repairs have to be made, the money is raised by direct taxation or appropriated by the council. A supposed brilliant showing during their term of office will reflect credit on themselves and their party. Operating expenses are easy to cut down at the expense of construction and rehabilitation accounts, and these distorted figures show a surplus. This is what they started in to demonstrate, that under a *business administration* they could make money for the city and still furnish as good gas as before for a little less money.

The popular belief that taxes will be lessened, prices reduced and the general burden lightened makes every voter feel that in casting his ballot for municipal ownership he is helping in a philanthropic cause. He argues that the city is entitled to the profits which are going to a chosen few; and why should they not get them, taking it for granted that the same conditions which exist under private administration will exist under public control. He has been told by the stump speakers that it is merely a question of electing the party that stands for the principles, and the much sought for relief will be immediately evident.

The last municipal campaign in Chicago was a fight between one party whose candidate for Mayor stood for eventual municipal control of the street railway system and the victorious party whose platform called for immediate muuicipal control of the same utility. The majority of the people believed that conditions would immediately lend themselves to the magic touch of that panacea for all social ills—municipal ownership. Several months have elapsed and Mayor Dunne and his associates have not yet made public all of their intended policy.

Can it be that a careful study by them has opened up unforeseen

difficulties? Has the opinion of the Scottish expert set them to thinking? At any rate the promises are a little slow in maturing, and the former public enthusiasm is not quite as perceptible.

What is apparently true of the public in general is in a measure true of the public officers. There seems to be less activity, due perhaps to lack of incentive in the administration of affairs of municipally controlled corporations than in those of private companies. The private officers usually feel that they are a part of an organization which will thrive and flourish only in proportion to their personal efforts, and if the results are not forthcoming their removal is probable.

The public officer when he is appointed to a position may feel that if enough influence existed to place him in his position, enough will exist to keep him there, and that his removal will at least be difficult to accomplish. Two cases of this kind have come under our observation in St. Louis this year, where the mayor had plenty of trouble to remove the Health Commissioner and the Commissioner of Public Buildings, both of whom actually defied displacement. Let us contrast this with the case of a private concern where they would have simply been dismissed, and we will get some idea of how incumbents of public offices regard their positions.

If instead of leaving a movement before it is half finished, it were pushed to a successful issue, more marked results could be obtained, but it seems to be the tendency to partly finish one idea and then pass to a newer plan.

In England it is said that in extending municipalization to so many branches, the tax rates are going up, the taxable property not increasing in value to keep abreast with the popular movement. I will quote an abstract from the paper read by Mr. Dixon H. Davies at the meeting of the Society of Arts, February, 1903. Mr. Davies, in speaking of the local indebtedness, says:

"The subject has grown not only in public prominence, but also in the magnitude of its operations during these 4 years: but so belated are the returns of the local government board that it is not possible to give statistics which are less than 3 years in arrears. Making the best of the available materials, it may be said that the local indebtedness of England and Wales now amounts to upwards of £300,000,000—little short of £10 per head of the population. Of this huge sum as nearly as possible one-half has been raised for undertakings which are classed as reproductive. The serious element in this half of the debt is not in its present amount, but its steadily accelerated rate of growth. This element is especially evident in those portions of the debt which have been incurred for definitely trading purposes. To exhibit this, the debt for tramways, electric supplies, housing, and gas, has been distinguished from that representing water, cemeteries, harbors, and other more legitimate forms of communal adventure. Roughly, the general local debt doubles itself in 20 years; the strictly trading debt in 2 years.

"Taking a period from 1881 to 1900, and comparing for certain typical cities the increase of the debt and the gross rates with that of the population and valuation, the growth of population has been outpaced by the growth of the debt by no less than 500 per cent. in Sheffield and by 85 per cent. both in Liverpool and London, and by that of the rates by as much as 115 per cent. in Sheffield, 180 per cent. in Cardiff, and 250 per cent. in London. The valuation list fails to disclose any increment in the property value at all adequate to those heavy sums which have been charged upon it. In Manchester, for instance, the gross amount levied for rates has increased 178 per cent. in the period, but the property rated has only risen 12 per cent. in value. It is, therefore, difficult to discover any sign of pecuniary advantage to compensate for the added burden. The enormous increase in the amounts levied by the local authorities is obtained not only from a high poundage of the rates, but also from an enhanced assessment of property."

Mr. Davies also makes an important point on the lack of voice of those having more taxes to pay as compared with those who actually alter and make new conditions, as follows:

"Before leaving the figures, attention may be called to the increasing extent to which pecuniary responsibility is becoming divorced from control. An examination of the rate books has been made in two typical northern towns—Sheffield and Manchester. In each case the occupiers of the working class houses represent more than half of the voters' register, while the assessment of the whole of their houses amounts to less than that of the property of the manufacturing, railway, and other companies, which have no vote at all. This disproportion is growing, for in both towns the companies' assessment has increased, in the 10 years 1890–1900, upwards of 55 per cent., while the small houses only stand at 10.72 per cent. in Sheffield and 21.77 per cent. in Manchester more than they did 10 years before (an increase due to the larger number of workmen's houses) so that while the disfranchised class has to pay as much again, the artisan ratepayer and voter contributes about the same as he did 10 years ago in the treasury of his town. A democracy surely required that taxation and representation should go together. The figures show that those who provide the greater portion of the funds for the authority are without any voice at all in the election of the local governors or in the control of their policy. So long as they confined themselves to matters of police, health and education, no one complained, for these concern all ratepayers equally. Trading undertakings on the contrary are not of equal concern, and the control of them cannot justly be vested, except in those who provide the funds for carrying them on. Property qualifications are out of fashion nowadays, but if our municipal institutions are to be saved from the discredit and disaster which unjust practices of this kind will surely bring upon them, means must be found to confine them to the proper functions of government."

Australia is also in the throes of too much municipalization, or as it has been aptly put, "Governed to death." The public utilities are under the control of experimentalists, and the country is feeling sharply the burdening effects of operating public utilities as an adjunct to the political organization.

In the United States, where it should be admitted that our present political systems do not present anywhere near as good conditions and circumstances as prevail in England, Scotland and Australia, for the success of extending municipal ownership to a great many kinds of business, we should take heed and profit from the mistakes of our European friends.

Up to the present time we have not departed very far from the old policy of privately conducted business, and we are not in any particular danger of impeding the great progress which is bound to result in a country abounding in so many natural resources, and where energy is a predominating characteristic of the people in general, but we are ready to adopt any plan which will benefit the greatest number.

If our present systems and institutions are all wrong, the errors will be adjusted as rapidly as the difficulties appear. We do not argue that the present form of private corporation is ideal; it may need regulation. We have not all agreed that the gigantic trusts are entirely in accordance with strict economic principles, but we are all of the same opinion that all these difficulties will disappear if the proper interest is manifested by every citizen in each of the public questions in the due order of their importance.

In the United Kingdom, where municipal and private ownership have worked side by side for many years past, we do not find such great differences in results accomplished by the companies themselves. According to the return of the Board of Trade from the period 1887 to 1904 the privately owned gas works increased from 384 to 428 in number, while the municipal plants increased from 168 to 260.

In 1887 the percentage of total gas works which were municipally owned was 30 per cent., increasing to 33 per cent. in 1903, or in 16 years 3 per cent. has marked the advance of strict municipal ownership as applied to gas works in England. This may not be very gratifying to those exponents of the doctrines who are always pleased to quote English practice and point out what rapid strides are resulting from municipal ownership, but it means that if private control was not properly regulated 20 years ago it is doing quite as well under the present conditions as municipal ownership; and if it is satisfactory, as we are led to believe, there is a great deal of unnecessary agitation. Furthermore, the English people must see some greater difficulties ahead, for there can be no doubt that from its very nature municipal ownership is bound to be a popular movement.

At present there are 25 municipally owned and operated artificial gas plants in the United States, which supply cities varying in size (according to the Census of 1900) from 573 to 85,050 inhabitants.

From the report of the Commissioner of Labor, 1899, we find that 951 privately owned and about 14 municipally owned gas works were being operated, making a total of 965 works in this country. Of that total the municipal works represented 1.4 per cent., practically a negligible percentage. Now, if we consider that the total number of gas works had not increased any in the past 6 years, and compute the percentage of the total plants on the basis of those which are now municipalized, we find that this percentage is 3.7. These percentages speak for themselves. The small number of municipal gas plants in this country may not be due to present private systems giving perfect satisfaction, but it is a testimonial of confidence in the general principles of private control, at least as far as the present generation is concerned. On the other hand, Paris, Ky., has repudiated municipal ownership and has sold its works recently to a private company.

Philadelphia is experiencing a satisfactory service under the management of the present lessees. Wheeling is at a loss to know what is the best plan to pursue in the future, and a great number of the municipalities do not really know whether they are operating successfully or not, so probably the municipal operations should be questioned.

If an examination of municipal plants is to be intelligently made it will be necessary that the present system of accounting in use in various cities be abandoned and up-to-date methods installed. Many of the leading advocates of social reforms have found it impossible to collect sufficient data to really substantiate their ideas which appear to be

theoretically correct. Many have complained of the sore need of more reliable statistical matter, and mostall have concluded that if a simpler, more logical system of bookkeping be employed by municipalities, the task of getting information quickly would be greatly simplified.

Mr. Richard T. Ely, a noted authority on municipal affairs, in his book "The Coming City," brings out this point very forcibly. Prof. Ely says:

"One of the first and most essential reforms in American cities is an improvement in financial methods. Municipal accounting needs a thorough overhauling, and a good budgetary system must be part and parcel of every excellent municipal government."

The following table will show that the problem is limited to cities of small sizes:

TABLE I.—*Municipal Plants in the United States.*

Name.	Population U.S. Census, 1900.	Year Municipalized.	Present Price of Gas		Price of Gas Year Previous to Municipalization		
			Fuel.	Ill.	Fuel.	Ill.	
Talledaga, Ala.....	2,661	1901	1.00	1.25	1.25	1.75	
Norwich, Conn....	17,251	1904	1.25	1.25	1.26	1.55	
Cartersville, Ga....	2,500	1903	4.00	4.00	....	....	Oil gas.
Dalton, Ga.....	4,315	1900	1.00	1.00	1.50	1.50	
Henderson, Ky....	10,272	1882	1.00	1.00	1.50	1.50	
Westfield, Mass....	12,310	1899	1.47	1.47	1 60	1.60	
Wakefield, Mass....	9,290	1894	1.69	1.69	1.60	1.80	
Middleboro, Mass..	6,885	1893	2.10	2.10	....	....	Oil gas.
Holyoke, Mass.....	45,712	1902	1.32	1.32	1.35	1.30	
Escanaba, Mich....	9,549	1895	.75	1.50	1.50	1.50	
Duluth, Minn.....	52,969	1898	.75	.90	....	....	
Adams, Minn.....	573	....	1.50	1.50	....	....	
Renville, Minn....	1,075	1903	1.50	1.50	1.50	1.50	
Rich Hill, Mo.....	4,053	1903	1.00	1 00	2.00	1.50	
Hamilton, O.	23,914	1890	.80	.80	2.00	2.00	
Bellefontaine, O...	6,649	1873	.75	1.25	....	....	
De Smet, S. D.....	749	....	2.00	2.00	....	....	
Richmond, Va.. ..	85,050	1852	1.00	1.00	....	....	
Danville, Va.....	16,520	1876	1.00	1.00	4.00	4.00	
Alexandria, Va....	14,528	1853	1.20	1.20	....	....	
Charlottesville, Va.	6,449	1876	1.00	1.00	3.50	3.50	
Fredericksburg, Va.	5,068	1891	1.25	1.25	3.00	3.00	
Wheeling, W. Va..	38,878	1870	.75	.75	3.50	3.50	
Gilroy, Cal.....	1,820	....	2.50	3.00	....	....	
Santa Clara, Cal...	3,650	....	1.75	1.75	....	....	

In addition to the above the following plants have municipal control:

No Gas Works—Gas Bought from Neighboring Town.

Reading, Mass. Gas bought from Wakefield.

Works in which City Owns Part Interest.

Louisville, Ky. City owns about one-fourth interest.
Danville, Ky. " " one-fifth "

Works Owned by City—Leased to Private Company.

Philadelphia, Pa.

Summary.

Works operated and owned by city	25
No works—gas bought and supplied by city	1
Gas works in which city has interest	2
Works leased to private company.	1
Total	29

Comparisons of Gas Companies.—The inadequacy of sufficient and reliable data increases the difficulty of making proper comparisons of different situations. The Fourteenth Annual Report of the Commissioner of Labor contains a great deal of general information of gas companies, and shows very clearly the varying conditions in the United States. From these statistics it is very evident that whatever general classification is made, the lack of uniformity of the data is very prominent, and this can be explained by saying that each city has its own peculiarities and conditions. This is recognized by the leading social scientists, but if it is necessary to compare two cases it would be well to take into account certain salient features which would make the comparisons more equitable.

Interest and Capital.—The first question that might be raised is that of the total investment. The capital charge per 1,000 sold is always an important item, so necessarily the rate of interest must be known. It has often been argued that only such interest charges should be made as are represented by the interest on the duplication value of the plants. This has always been a very convenient method of showing up exorbitant profits.

Let us take the usual example: "A" builds a plant for manufacturing a certain article, and the investment in the plant, etc., at the end of 5 years is represented by $10,000. At that time "B" opens up his factory of the same capacity to manufacture the same article, and $7,000 represents his investment. "A" will have to earn interest on his investment of $10,000, while "B" has only $7,000 to earn interest on, and therefore ought to be able to place his commodity on the market cheaper than "A," as far as an interest charge is concerned. Now, there is no way of getting around this unless we charge off a sufficient amount for depreciation and consider that the interest separately earned on the depreciation fund is used for making up the discrepancy. Coming back, however, to the original proposition, we find that there is a great diversity of opinion on this matter, but it is the present accepted practice to charge interest on the entire investment value and not on the duplication value.

Then there is another case, such as occurred at Haverhill, Mass. Originally in 1871 the capital was fixed at $75,000, no attempt being made to increase the capital through the prosperous years, but due to careful and skillful management a surplus of $300,000 was accumulated in the shape of new plants, extensions, etc. Calculating the profits on the original capitalization the earnings seemed high, so the Mayor and others petitioned the State Commissioners to reduce the price of gas to such a price as to enable the Gas Company to only earn dividends of 8 per cent. on its original capital of $75,000. While the petitioners asked for a reduction to 70 cents, the Commissioners allowed a reduction to 80 cents per 1,000. This decision will have the tendency to discourage the same diligence in management, and practically amounts to municipal ownership of the plant, simply paying the operating company 8 per cent. on its original investment for assuming the risk to operate the same, besides standing liable for any losses which might be incurred. This illustrates why the exact and full information would be needed in comparing Haverhill with some other company just on the points of capital and interest alone.

Depreciation.—Many of the municipal plants are neglecting to make the proper charges for depreciation, and even if we would compare two places, one privately and one municipally operated, where depreciation was a recognized charge, we would find that each would have its own peculiar system, one perhaps charging off 3 per cent., and the other 5 per cent.; depreciation being considered a function of local conditions. But since the depreciation fund has been considered in accordance with sound principles, note should be taken of its absence, and the proper charges should be made.

Taxation.—We have read much of the inequality of taxation of large corporations, we have voted on laws covering certain phases of the subject, but we cannot understand why the taxes relinquished on industry, by reason of municipalization, should not properly be charged in figuring the costs and profits of the municipal undertaking. The city's property actually subject to taxation will certainly be decreased and the income decreased unless the municipal plant be considered in the same way that the privately owned plant is, and a corresponding tax exacted. In England this is a recognized principle, and it is only fair that consideration be given to the idea in this country. Here again we cannot fail to notice what a difference local conditions might make in comparisons.

Location, Effect on Raw Materials and Residuals and Labor.—Geographical location, railroad and other transportation facilities, play a great part in the cost of raw material. In a great many instances the freight rate greatly exceeds the cost of coal, so if two different companies are manufacturing coal gas, and one is situated in the gas coal region while the other is many hundred miles distant, we would hardly expect the cost of coal per 1,000 made to be the same. However, the place where the coal was more expensive would probably offer a better market for coke, thus some of the difference might be reduced; but attention to these points will not fail to bring out a fairer comparison. What holds good for coal holds good for oil and the other raw materials, and in a certain degree for the residuals, so it is well to give due weight to the difference in the market. We find, too, that labor conditions vary in different localities, some places being strongly unionized, some cities having in abundance cheap foreign element, and where corporations employ a large force, as gas companies do, a general survey of the wage question will be an aid in deductions.

Consumption.—Consumption per consumer per capita, per meter, per mile of main, capital per 1,000 sold and the like, will assist in the examination, for these with the other necessary data will at once tell much to the trained mind of the manager of the present results and the prospects of future business.

Candle Power and Quality.—A difference of a few candles will, of course, affect the cost of manufacture within certain limits, likewise a

gas of low heating value should not be directly compared with one a great deal higher in B.T.U.'s, and while it would take a long series of calculations to make a fair comparison of the two gases, the difference of quality should not be concealed by saying "City A" furnishes nearly as good gas as "City B," but cognizance should be taken of the fact if there is any great difference in these particulars.

Extra Charges.—The net price for gas does not always tell the whole story. There is some importance in the quality of service. It must be some convenience in being able to have an ample supply of gas when you need it; there is surely some advantage in being able to buy the latest appliances at low rates, have them connected up free of charge, have services run without expense, meters installed without a monthly rental charge. If the housewife is taught how to get a maximum efficiency out of her gas stove she appreciates it, but hardly stops to think of the saving in gas thus accomplished. Some companies have a staff of demonstrators who give this instruction free of charge. In some of the larger cities where the volume of business has greatly increased, different rates for discount have been established for the convenience of the customer; they have even gone so far as to establish sub-stations at which gas bills can be paid without an additional expense, in proximity of the homes, and while these things appear to amount to little and have been done for mutual benefit and gain, they should not be overlooked in comparing with companies where the same courtesy and facility do not exist.

While it will be impossible to obtain the proper data in all cases for comparisons, and probably the truth may never be brought out, it will be fairer to all if parallelisms be drawn only after the examples are reduced to as near the same basis as possible.

It was the original intention to take the data of the municipal plants and compare it with that of privately owned corporations. A list of questions was mailed to the important municipal plants, but the responses to the requests for the information were so few, and such information as was received was so lacking in detail and uniformity, that the idea had to be abandoned. We do not attribute the failure to comply with our requests to the lack of desire to furnish the figures, but rather to the absence of such data on their own books.

Statistics.—We will now take up the situation at Wheeling, W. Va., and with the aid of a few figures will try to bring out some of the peculiarities which may arise under municipal ownership. It is the popular belief that Wheeling is an example of municipal success, but as will be seen there are some grounds for doubting this contention.

Wheeling, W. Va.—We have chosen Wheeling, W. Va., as one of the cities typifying the early idea of municipal ownership of gas plants. This city has often been cited in substantiation of the principal arguments for this doctrine. The gas works was taken over by the city in 1870, when $100,000 bonds were issued to purchase the same. The management and supervision of the gas works are vested in three trustees who hold their office for 2 years. The trustees appoint such officers as superintendent, secretary, and also pass on applications for positions at the works under the superintendent.

When municipal control was assumed the price of gas was $3.50, and by successive steps the price was reduced to $1 gross or 75 cents net, if paid by the 10th of the month, remaining at this price for at least the past 16 years.

The city manufactures straight coal gas of 16-candle power and sells it for illuminating purposes, as natural gas competition at 18 cents per 1,000 practically prohibits the use of artificial gas a fuel. One of the clauses of the Wheeling natural gas company's franchise is intended to prevent the sale of natural gas for illuminating purposes, but some enterprising citizen recently took exception to the law and was promptly prosecuted. In his decision on the case last June, Judge Hugus held that the city has no right to say what shall be used as an illuminant, and if the natural gas company chose to sell a customer gas for illuminating purposes he could use it, but he also pointed out that the city could proceed in a civil suit against the natural gas company for violation of its contract. Pending the outcome of this controversy, the municipal gas company is at a loss as to what future policy to pursue. It is evident that if a decision is handed down in favor of the natural gas company, the city will either have to buy out the natural gas company, which it can do according to the terms of the franchise, or reduce its price for gas so as to be able to compete with natural gas, and it seems as though the former would be the only logical course to follow. We can see no good reason why the municipal plant should not be entirely abandoned, and the people be allowed to enjoy the benefits of the much cheaper natural gas. Municipal ownership should not be allowed to prohibit the people from taking advantage of this much cheaper commodity merely to maintain the artificial gas plant because it now exists. In the meantime the much needed repairs and extensions will be postponed.

To get some idea of the present condition of the manufacturing plant, we need only say that some prominent consulting engineers have estimated that it will take at least $70,000 to put the existing plant in condition to meet the present demand, but a personal visit would immediately impress on your minds the state of deterioration. The taxpayers of Wheeling were greatly astonished at the report of the engineers, and they now realize that the past policy of supporting a municipal electric light plant at the expense of the gas plant is disadvantageous. It is not surprising that the general public did not know the true condition of affairs, for they had their Board of Trustees to attend to these details, but they were easily awakened to the fact that there must be something else to the management and operation of gas plants besides shoveling coal into retorts and collecting the money. All of the calculated net earnings of gas department which were figured as profit (no account, however, having been taken of such items as interest and depreciation on the investment, or taxes), were diverted into the electric department fund, and this balance went to defray the expense of public street lighting. Instead of using this supposed surplus for either reducing the price of gas, or making the necessary repairs (the former, which according to municipal ownership exponents, is one of its great benefits) it was used in making the gas consumer pay more than his legitimate share of the street lighting expense.

The ratio of taxpayers to consumers is about 3 to 1; therefore, one-third of the taxpayers (provided all the consumers are taxpayers, which is hardly probable) contributed $27,355.36 in 1904 for lighting the streets, besides giving to the gas works simply as that portion of the total number of taxpayers $20,505, which was appropriated by the Council for the support of the gas works. Similarly in other years past they have paid this double tax for the benefits in which the entire population of 40,000 people shared.

Consumption.—In 1890 Wheeling sold 30,012 cubic feet of gas per consumer, and in 1904 sold 22,338 cubic feet per consumer, a net decrease of 36 per cent. in 14 years, while the sales per capita decreased from 3,301 to 2,775, or about 19 per cent. during the same period of time. This would all show that although gas has been increasing in popularity throughout the United States, Wheeling has been going backward, but it must not be forgotten that natural gas is sold at a very low rate for heating purposes. Granting that natural gas has made inroads into the city gas company's business, the statistics should not show such a large decrease, and if a private corporation was seeing its business slip away at this rate it would surely have bought out or combined with the natural gas company, which in either case would have greatly benefited the consumer.

You will all agree that the management by a city of a public utility corporation should not differ from that of a privately controlled company, in that the invested money should yield a certain minimum rate of interest; the depreciation of the plant should be properly provided for, and should be charged the same, with the taxes, etc., as a privately controlled corporation. If after all these charges are properly made and the necessary repairs, extensions and improvements are carried on in accordance with a broad policy, the returns show a profit, then and only then can the venture be called successful.

Wheeling has been neglecting to charge interest, depreciation, etc., and has apparently made a good showing; but a casual glance at the statistics will point out to you their fallacious belief.

Referring to Table No. III., we see that the total net cost of gas per 1,000 sold for the years 1902, 1903 and 1904, varied from 61 to 68.9 cents, averaging 64.7 cents. Add to this the average interest, depreciation and taxes per 1,000 sold, and we find that the gas, if the proper charges had been kept, would average 98.2 per 1,000 sold, and that the average loss per 1,000 sold would be 22.6 cents. On further examination of the data we perceive that as much as 23 per cent. of the gas made is unaccounted for, and that the yield per pound of coal in 1902 was only 4.12 cubic feet, but has come up to 4.22 cubic feet in 1904. The leakage and the poor yields certainly account for some of the poor showing, indicating also laxity in operation which is generally true of municipal plants, and, regardless of what has been said to the contrary, this particular cases illustrates the point.

Extra Charges.—The usual fees for resets, services and installation are charged, and the following rules made by the City Council governing each case are self-explanatory:

"Whenever a meter is not in use or rented, the same will be promptly removed and a charge of $1 will be made when it is afterwards reset, provided no new tubing connection, cock or box has to be furnished; otherwise the charge shall be according to Rule 27.

"No rent will be charged for the meter for any month when at its end a bill can be made for 200 cubic feet of gas or more. When at the time for making bills the quantity registered since the last bill for gas is less than 200 cubic feet, the amount will be included in the bill for the next month's consumption and meter rent will be charged as follows:

For a 3, 5 or 10-light meter, 20 cents per month.
For a 20-light meter, 40 cents per month.
For a 30-light meter, 60 cents per month.
For a 45-light meter, 80 cents per month.
For a 60-light meter (or larger) $1 per month.

"The trustees will attach a meter on proper application, and fix the same in proper place, and connect it with lead tubing to the service pipe, upon being satisfied that the bill for such adjustment will be promptly paid. The charge for adjusting the meter, box, lead tubing and meter cock, all to remain the property of the city, to be as follows:

Size of Meter.	Charge.	Size of Meter.	Charge.
3-light	$3	45-light	$15
5- "	5	60- "	17
10- "	8	80- "	20
20- "	10	100- "	23
30- "	13	150- "	25

"Until further ordered no charge will be made for renewing the meter as often as the ordinary rust and wear of the same may make such renewal necessary, but in case of any other damage to the same the gas will be shut off until the city is reimbursed as provided."

In making up the revised summaries, shown in tables V., VII. and IX., gas given to the charitable institutions was credited at 75 cents instead of $1 as shown in tables No. IV., VI. and VIII., for the reason that 75 cents net is the rate charged to all consumers. Tables V., VII. and IX. represent, as near as it is possible to procure the data, a fair general statement of affairs in Wheeling for the years 1902, 1903 and 1904, the lack of information (due to their system of accounting) making it difficult to present anything but a close approximation of the truth.

It might be interesting to follow out the results obtained at Wheeling's municipal electric plant which furnishes current for 510 lamps for lighting the city streets, but time does not permit, and it is sufficient to say that in 1904 for all night service the cost of 510-9.6 ampere, 50 volt, 2,000 candle power lamps, without interest, depreciation, taxes, insurance, etc., was $53.63 per lamp per year. The book value of the system is given at $120,000. This plant is operated in conjunction with the gas plant, and all earnings of the gas plant are contributed to its support.

TABLE II.—*Wheeling, W. Va.—Gas Departmant.*

	1902.	1903.	1904.
1. Book value of plant and distribution system	$405,868.98	$405,868.98	$405,868.98
2. Probable assessed value of plant and distributing system	200,000.00	200,000.00	200,000.00
3. Gas sold to private consumers, plus gas free	111,076,700	117,728,000	118,670,900
4. Gas made, cubic feet	139,495,000	148,980,000	154,160,000
5. Gas unaccounted for, per cent. of make	20.4	21	23
6. Coal carbonized, pounds	33,645,915	36,617,525	36,480,070
7. Yield per lb. of coal (cu. ft.)	4.14	4.07	4.22
8. Cost of coal, per ton	$1.67	$1.67	$1.67
9. Cost of hauling per ton to yard	.21	.21	.21
10. Cost gross coal per 1,000 made	.227	.231	.223
11. Increase in cost of coal per 1,000 made, if coal had cost $1 per ton more	.120	.123	.1185
12. Average price received for gas per 1,000 sold	.755	.756	.756
13. Receipts from meters, services, calls, etc., per 1,000 sold	.032	.025	.029
14. Interest, depreciation and taxes per 1,000 sold	.349	.330	.326
15. Candle power supplied	16	16	16
16. Gas sold to private consumers	107,750,000	115,310,100	116,561,400
17. Number private consumers	4,871	5,037	5,218
18. Gas sold per private consumers	22,123	22,892	22,338
19. Number miles of main	21	21	21
20. Private consumers per mile main	232	239	248
21. Gas unaccounted for per mile of main	1,353,252	1,488,190	1,689,951
22. Book value per 1,000 sold	$3.60	$3.40	$3.36
23. Percentage of cost of coal returned from residuals	65	68.8	65.6
24. Population	39,017	41,437	42,000
25. Gas sold per capita to private consumers	2,762	2,783	2,775
26. Approximate no. taxpayers	14,000	14,000	14,000
27. Per cent. taxpayers to consumers	34.8	35.9	37.3

TABLE III.—*Wheeling, W. Va.*

	1902.	1903.	1904.
1. Cost of gas in holder per 1,000 sold	.605	.71	.670
2. Credit netted for residuals per 1,000 sold	.185	.201	.185
3. Net cost of gas in holder per 1,000 sold	.420	.509	.485
4. Distribution charge per 1,000 sold	.090	.080	.120
5. Management charge per 1,000 sold	.035	.030	.020
6. Purification charge per 1,000 sold	.03	.030	.010
7. Miscellaneous charge per 1,000 sold	.035	.040	.007
8. Total net cost of gas per 1,000 sold	.610	.689	.6420
9. Interest per 1,000 sold	.180	.170	.168
10. Depreciation per 1,000 sold	.135	.128	.126
11. City and county taxes	.034	.032	.033
12. Total corrected cost of gas per 1,000 sold	.959	1.019	.969
13. Average price received per 1,000 sold	.755	.756	.756
Net loss per 1,000 sold	.204	.263	.213

TABLE IV.—*Wheeling, W. V.—Gas Board's Report, Year* 1902.

Free Gas.

Wheeling hospital	$300.00	
City hospital	300.00	
Home for aged and friendless women	63.70	
St. Alphonsus Weisen Verein	32 20	
City building	200.00	
Second ward market house	460.00	
Fifth ward market house	400.00	
Vigilant engine house	226.30	
Seventh ward hose house	83.30	
Chemical hose company	164.10	
Atlantic engine house	267.40	
Patrol house	88.50	
Hook and ladder company	146.70	
Niagara engine house	345.80	
Eighth ward engine house	71.90	
Fort Henry hose company	109.00	
Old water works	67.80	
		$3,326.70

Receipts of the City Gas Works for 1902.

Ammoniacal liquor		$1,933.37	
Attending calls and adjusting meters		98 00	
Coke		10,694.24	
Gas		80,507.69	
Meters		939 00	
Meter rents		585.00	
Services		1,924.95	
Tar		7,882.73	
Lamp posts, old iron, etc.		35.00	
Received from City Council		8,000.00	
Delinquents—1895	$1.30		
1896	19.60		
1897	1.60		
1898	2.70		
1899	13.70		
1900	34.20		
1901	300.25		
1902	898.25		
		1,271.60	
			$113,871.58

Expenditures of Gas Works for 1902.

Apparatus and repairs	$2,256.13
Attending calls, adjusting meters, wages and material	2,355.05
Blacksmithing and iron for tools	399.45
Coal	23,027.87
Expense, salaries and miscellaneous	6,084.71
Hauling coal	2,822.96
Hauling coke	1,949.78
Gas making wages	33,830.14
Interest on overdraft in bank	153.41
Lime for purifying gas	1,948.49
Meters	3,408.99
Miscellaneous	138.21
Renewing retorts	3,100.00
Services, wages and material	4,742.94
Stable food for 4 horses, repairs to wagons, cart and harness, veterinary, shoeing, horse hire, repairs to stable and 2 new horses	1,069.26
Tar barrels	40.40
	$87,327.79

Disbursements for City Elertric Plant for 1902.

Carbons and globes	$5,435.27	
Coal	4,227.09	
Oil, waste and packing	195.62	
Repairs and apparatus	2,730.01	
Wages	13,955.80	
		26,543.79

Total number of lamps.....509
Average cost per lamp.....$52.14¼

Recapitulation.

Total receipts		$113,871.58
Expenditures for gas works	$87,327.79	
Disbursements for electric plant	26,543.79	
		113,871.58

TABLE V.—*Wheeling, W. Va.—Gas Department.—Year* 1902.

Revised Summary.

Receipts as taken from annual report, 1902	$113,871.58
3,326,700 cubic feet free gas credited at 75 cents per 1,000, instead of $1, as per report	2,495.03
Gas, stock on hand Jan. 1st, 1902—425,000 cubic feet at 55 cents per 1,000	233.75
Coal, tar, etc , on hand Jan. 1st, 1902	762.27
Tools, fittings, etc	5,803.65
Receipts, stock, etc.—grand total	$123,166.28
Total expenditures, as taken from annual report, 1902	$87,327.79
Gas stock on hand, Jan. 1st, 1901—505,000 cubic feet at 55 cents	277.75
Coal, tar, etc., on hand Jan. 1, 1901	1,547.45
Tools, fittings, etc., on hand Jan. 1, 1901	6,259.45
Interest on book value—$400,000 at 5 per cent	20,000.00
Depreciation on book value, minus real estate—$300,000, at 5 per cent	15,000.00
City taxes on assessed value—$200,000, at $10.40 per 1,000	2,080.00
County and State taxes on assessed value—$200,000, at .85 cent per 1,000	1,700 00
Appropriation received from City Council	8,000.00
Expenditures, stock on hand Jan. 1, 1901, interest, depreciation, taxes, etc.—grand total	$142,192.44
Receipts, stock, etc	123,166.28
Estimated deficit, 1902	19,026.16

TABLE VI.—*Wheeling, W. Va.—Gas Board's Report.—Year* 1903.

Free Gas.

Wheeling hospital	$300.00	
City hospital	300.00	
Home for aged and friendless women	63.70	
St. Alphonsus Weisen Verein	32.20	
City building	100.00	
Second ward market house	475.00	
Fifth ward market house	420.00	
Vigilant engine house	171.40	
Seventh ward hose house	18.20	
Chemical hose company	47.40	
Atlantic engine house	76.30	
Patrol house	116.70	
Hook and ladder company	42.40	
Niagara engine company	45.60	
Eighth ward engine company	11.20	
Fort Henry hose company	128.00	
Old water works	69.80	
		$2,417.90

Receipts of the City Gas Works for the Year 1903.

Ammoniacal liquor	$1,896.64	
Attending calls and adjusting meters	84.00	
Coke	11,387.16	
Gas	86,131.46	
Meters	747.00	
Meter rents	603.60	
Services	1,457.62	
Tar	10,048.00	
Carbon boxes	12.24	
Received from City Council	17,750.00	
Delinquents—1898	$7.10	
1899	1.80	
1900	3.00	
1901	15.70	
1902	253.07	
1903	1,034.55	
	$1,315.22	
		$131,432.94

Expenditures of Gas Works for the Year 1903.

Apparatus and repairs		$2,215.40
Attending calls, adjusting meters, wages, material		2,421 23
Blacksmithing and iron for tools		436.54
Coal		35,817.63
Expense, salaries and miscellaneous		6,238.30
Hauling coal		3,907.29
Hauling coke		2,421.98
Gas making wages		36,766.24
Interest on overdraft in bank		288.04
Lime for purifying gas		2,194 51
Meters		3,291.99
Miscellaneous		153.61
Renewing retorts		2,875.00
Services, wages and material		3,973.44
Stable feed for 4 horses, repairs to wagons, cart and harness, veterinary, shoeing, horse hire and 2 new horses	1,399.48	
Tar barrels	58.25	
		$104,458 95

Disbursements for City Electric Light Plant for 1903.

Carbons and globes	$2,043.93	
Coal	5,046.59	
Oils, waste and packing	243.61	
Repairs of apparatus	2,451.21	
New roof	2,765.00	
Wages	14,412.06	
		$26,962.40
Total number of lamps....510		
Average cost per lamp....$52.86¼		

Recapitulation.

Total receipts		$131,432.94
Expenditures for gas works	$104,458.95	
Disbursements for electric light plant	26,962.40	
		$131,421.35
Leaving a balance of		$11.59

TABLE VII.—*Wheeling, W. Va.—Gas Department.—Year* 1903.

Revised Summary,

Total receipts, as taken from annual report, 1903	$134,432.94
2,417,900 cubic feet of free gas credited at 75 cents per 1,000, instead of $1, as per report	1,853.93
Gas, stock on hand Jan. 1st, 1903—500,000 cubic feet at 55 cents per 1,000	275.00
Coal, tar, etc., stock on hand Jan 1st, 1903	588.98
Tools, fittings, etc., on hand Jan. 1st, 1903	5,239.79
Receipts, stock, etc.—grand total	$142,390.64
Total expenditures as taken from annual report, 1903	104,458.95
Gas stock on hand Jan. 1, 1902—425,000 cu ft., at 55 cents	233.75
Coal, tar, etc., stock on hand Jan. 1, 1902	762.67
Tools, fittings, etc., on hand Jan 1, 1902	5,803.65
Appropriation received from City Council	17,750.00
Interest on book value, $400,000, at 5 per cent	20,000.00
Depreciation on book value, minus real estate—$300,000, at 5 per cent	15,000.00
City taxes on assessed value—$200,000, at $11.05 per 1,000	2,201.00
State and county taxes on assessed value—$200,000, at .85 per cent	1,700.00
Expenditures, stock on hand Jan. 1, 1902, depreciation, etc., grand total	$167,910.02
Expenditures, stock on hand, interest, depreciation, etc	167,910.02
Receipts, stock, etc	142,390.64
Estimated 1903 deficit	$25,529.38

TABLE VIII.—*Wheeling, W. Va.—Gas Board's Report, Year* 1904.

Free Gas.

Wheeling hospital	$300.00	
City hospital	300.00	
Home for aged and friendless women	63.70	
St. Alphonsus Weisen Verein	32.20	
City building	125.00	
Second ward market house	480.00	
Fifth ward market house	430.00	
Vigilant engine company	43.40	
Seventh ward hose house	26.40	
Chemical engine	27.40	
Atlantic engine	65.70	
Patrol house	114.30	
Hook and ladder company	2.30	
Niagara engine company	52.10	
Eighth ward company	13.10	
Fort Henry hose company	1.70	
Old water works	32.20	
		$2,109.50

Receipts for the City Gas Works for the Year 1904.

Balance on hand Jan. 1, 1904	$11.59	
Ammoniacal liquor	1,474.51	
Attending calls and adjusting meters	98.00	
Coke	10,480.80	
Gas	86,756.37	
Meters	774.00	
Meter rents	782.60	
Services	1,784.47	
Tar	9,791.10	
Old iron, old lamp posts, old brass, copper, changing positions of lamps	79.75	
Arc lamps for city railway	27.70	
Appropriation rec'd from City Council	20,505.00	
Delinquents—1897	$5.00	
1898	7.20	
1900	10.40	
1901	1.00	
1902	10.70	

Delinquents—1903.....	$159.20		
1904.....	1,305.50		
		$1,499.00	
			$134,064.89

Expenditures for Gas Works for 1904.

Apparatus and repairs.....	$3,094.57	
Attending calls, adjusting meters, wages, materials, etc.....	2,487.39	
Blacksmithing and iron for tools.....	435.13	
Coal.....	31,673.52	
Expense, salaries and miscellaneous.....	6,075.79	
Hauling coal.....	3,937.60	
Hauling coke.....	2,589.91	
Gas making wages.....	35,977.09	
Interest on overdraft in bank.....	33.83	
Lime for purifying gas.....	2,066.68	
Meters.....	3,578.07	
Miscellaneous.....	92.56	
Services, wages and material.....	5,244.30	
Tar barrels.....	40.80	
Stable feed for 4 horses, repairs to wagons, cart and harness, shoeing, and 1 new meter wagon	809.49	
		$98,136.73

Disbursements for City Electric Light Plant for 1904.

Carbons and globes.....	$4,281.30	
Coal.....	5,346.77	
Oil, waste and packing.....	207.15	
Repairs of apparatus.....	3,530.90	
Wages.....	13,989.24	
		$27,355.36
Total number of lamps.....510		
Average cost per lamp.....$53.63⅓		

Recapitulation.

Total receipts.....		$134,064.89
Expenditures of gas works.....	$98,136.73	
Disbursements of electric light plant.....	27,355.36	125,492.09
Balance in bank Jan. 1st, 1905.....		$8,572.80

TABLE IX.—*Wheeling, W. Va.—Gas Department*, 1904.

Revised Summary.

Total receipts as taken from annual report, 1904.....	$134,064.89
2,109,500 cubic feet of free gas credited at 75 cents per 1,000, instead of $1, as per report.....	1,582.13
Gas, stock on hand, Jan. 1st, 1904—475,000, at 55 cents....	261.25
Coal, tar, etc., stock on hand, Jan. 1st, 1904.....	4,640.62
Tools, fittings, etc., on hand, Jan. 1, 1904.....	7,413 62
Receipts, stock, etc., grand total.....	$147,962.51
Total expenditures as taken from annual report, 1904.....	98,136.73
Gas, stock on hand, Jan. 1st, 1903—560,000 cubic feet, at 55 cents per 1,000.....	275.00
Coal, tar, etc., in stock, Jan. 1st, 1903.....	588.98
Tools, fittings, etc., in stock, Jan. 1st, 1903.....	5,239.79
Appropriation received from City Council.....	20,505.00
Interest on book value—$400,000 at 5 per cent.....	20,000.00
Depreciation on book value, minus real estate—$300,000 at 5 per cent.....	15,000.00
City taxes on assessed value—$200,000 at $10.30 per 1,000..	2,060.00
County taxes on assessed value—$200,000 at $8.50 per 1,000	1,700.00
Expenditures, stock, Jan. 1st, 1903, interest, depreciation, taxes, etc.....	$163,505.50
Expenditures, stock, interest, depreciation, etc.....	$163,505.50
Receipts, stock, etc.....	147,962.51
Estimated deficit, 1904.....	$15,542.99

Massachusetts.—From the Twentieth Annual Report of the Board of Gas and Electric Light Commissioners covering the annual returns for the year ending June 30, 1904, we find that out of 73 gas companies 4 are owned by municipalities: They are Holyoke, Westfield, Wakefield, and Middleborough. These cities had a population (according to the census of 1900) of 45,712, 12,310, 9,290, and 6,885, respectively.

Holyoke was taken over by the city in 1902 after a long and expensive legal fight, costing the city, in addition to the appraised value of the gas and electric plants, $109,952.56 in fees for public commissioners and expenses of litigation. The average price received for gas per 1,000 sold for the year 1904 was $1.32, while the average price received in 1901 was $1.34 per 1,000 sold; but as the plant was only recently taken over by the city we could not expect any great reduction in price. In 1904 the average price paid by the consumer for coal gas to companies in Massachusetts sending out annually more than 30,000,000 cubic feet each was $1.03 per 1,000, and while this difference in price paid in Holyoke as compared with the average does not decide that municipal ownership in Holyoke is not on a firm basis, it points out that the benefits to the citizens of other cities in Massachusetts are just as great, if not greater, where municipal ownership is not in force, provided other conditions are equal. This case, as well as others following, substantiates the opinion that it is positively necessary to have full information before a decision of value can be rendered, and thesefew figures are not offered as decisive evidence, or as against the municipal question.

Likewise, in Wakefield the average price received was $1.69, while the average for companies sending out less than 30,000,000 for 1904 was $1.56 per 1,000 for sales by meter. Westfield furnishes gas for 9 cents per 1,000 less than the average price, their annual sales by meter being respectively 11¼ and 17½ millions, in round figures.

If we were simply to compare 75-cent gas in Wheeling with the average price received for gas in Massachusetts on the basis of the difference in cost of gas coal (taking the yield per pound in Wheeling) at Wheeling and in Massachusetts, we find that with gas coal costing $1.88 per ton in yard at Wheeling, and averaging about $2 more per ton in Massachusetts, all other things being equal, it would increase the cost of gross coal about 24 cents per 1,000 made for Wheeling. This should make the price of gas in both about the same. As an example this may serve to illustrate that the question of price is not always a true measure of comparative values. The people of Wheeling might say to the people of Massachusetts that the prices they pay for gas are too high, and there would be about as much logic in it as saying that Glasgow has cheaper gas than Wheeling.

Manchester and Sheffield.—The comparison of Manchester and Sheffield offers a good opportunity of bringing out some of the principal differences which exist in municipal and privately owned plants in England. Manchester and Sheffield are two of the principal manufacturing cities in the United Kingdom and are quite the same in general industrial conditions. Manchester has a municipally owned and operated gas plant supplying a population of about 545,000 people. Sheffield is supplied with gas by a privately owned and operated company and has about 385,000 inhabitants.

Manchester paid on an average of 64.8 cents per 1,000 for the past 3 years for its gas, while Sheffield was charged 42.9 cents on an average for the same years. The average candle power at Manchester was 18.2 and at Sheffield 17.4—a slight difference in favor of Manchester.

Manchester supplies coal and water gas and Sheffield furnishes straight coal gas, and we will now review some of the manufacturing data for the years 1902, 1903 and 1904—all data, unless stated to the contrary, will be per 1,000 sold.

Sheffield's costs for coal and oil are less by 10.35 cents than Manchester's, besides receiving 8.73 cents more for residuals. This serves to illustrate that the private concern finds a better market for its residuals and purchases its raw materials at a lower price. Speaking of making contracts, Mr. Thomas, the General Manager of the Sheffield Company, says in part:

"I often get a fine bargain, the colliery owner knowing that the price paid will never leak out to his competitors." He then goes on to tell why this is possible. This factor, no doubt, plays a great part in the management of a gas company, and if the purchase of the important raw materials and the sale of residuals are left to a shrewd manager instead of a general board, the chances are that he will get a better price. Sheffield pays higher salaries and wages in its manufacturing plant, and no doubt this is profitable in the end. The other manufacturing items are about the same per 1,000 sold.

It costs Sheffield less to distribute 1,000 cubic feet of gas by 2¾ cents per 1,000 sold than Manchester. Whether this is due to the natural surrounding, or the difference in methods employed, I am unable to state. Manchester charges more for gas supplied to its suburbs than to city consumers, although some of the suburban points are no more than 2 to 3 miles from the center of the city. This difference amounts to about 6 cents per 1,000.

Manchester, although it is a municipal plant, pays .95 of a cent more for rates and taxes than Sheffield. Tax charges are almost invariably overlooked in the usual statements of cities of the United States, it being taken for granted that no such charges should be made, but in England they hold the opposite idea, which seems to be a fairer proposition. The other charges differ slightly, but we are safe in saying that the marked difference in total working expense, plus net coal, must be due to the managerial efforts exercised in purchasing the raw materials and selling the finished products.

Sheffield has a decided advantage in having, in 1904, a capital per 1,000 of $1.38, while Manchester's capital amounted $2.51 per 1,000 sold. In this respect both companies are below the average of the cities of their size, and in Sheffield this is one of the secrets of the low priced gas.

Both companies rent gas stoves; however, no meter rental is charged in Manchester, while Sheffield received a revenue of 2.38 cents per 1,000 sold from this source. This should really be charged against Sheffield, and if done would raise the net gas rental per 1,000 sold to 45.27 as an average for the past 3 years, instead of 42.9 as before mentioned.

Manchester operates its plant not with the idea of keeping the cost of gas down to the limit, but pays some of its profit into the city treasury to help defray other city expenses. In 1904 it turned over about $300,000 to assist in meeting other city debts, but with all this cut the rate for gas about 2 cents over last year. Sheffield on the other hand earns its maximum dividend of about 10 per cent., and all benefits of cheaper production go to the consumer directly in the shape of reduced prices.

and the difference in rates show which system benefits the consumer the most.

Sheffield supplies gas this year for about 36 cents per 1,000 for the average small consumer, and as low as 28 cents to consumers who use in excess of 6,000,000 cubic feet per annum. Manchester charges about 55 cents inside of the city, and about 51 cents in the suburbs.

In conclusion, it is readily apparent that the subject is most important, deserving careful study and consideration. It is entirely too large to allow of more than brief treatment in the space allotted this paper, but if the present effort will lead to further work along the same or other lines, thereby counteracting in some degree prevalent erroneous opinions, it will have served its purpose. I also desire to say that no attempt has been made to justify or detract from the honesty of purpose of those who hold opposite views. It has only been attempted to indicate that argument and investigation should always proceed from proper premises. The following tables, which were compiled from "Field's Analysis," will supply other information that might be interesting to the investigator:

TABLE X.

	Manchester.			Sheffield.		
	1902.	1903.	1904.	1902.	1903.	1904.
Total capital employed	$11,216,275.26	$11,476,725.35	$11,897,827.02	$4,561,939.15	$4,561,939.15	$4,790,905.06
" " " (corrected)	11,216,275.26	11,476,725.35	11,897,827.02	4,561,939.15	4,561,939.15	4,790,905.06
Capital employed 1,000 cubic feet sold	2.431	2.512	2.512	1.586	1.702	1.681
Candle power supplied (flat flame)	18.54	18 25	17.80	17.41	17.37	17.36
Average price charged per 1,000 cubic feet sold	$.6685	$.669	$.607	$.457	$.446	$.384
Miles of main in use	823	831	843	504	518	528
Number private consumers	136,920	141,954	146,457	69,608	71,740	74,204
Private consumers per mile main	166	171	174	138	138	141
Number public lamps	17,987	18,629	19,031	9,489	9,770	10,174
Gas made, 1,000 cubic feet	4,869,976	4,838,636	4,986,917	2,879,173	2,857,657	2,896,989
Gas sold to private consumers, 1,000 cubic feet	4,277,958	4,204,317	4,336,857	2,528,749	2,495,509	2,521,075
Gas sold per private consumers, cubic feet	31,244	29,617	29,612	36,328	34,780	33,975
Gas sold for public lamps, 1,000 cubic feet	351,581	370,547	388,295	191,852	192,007	193,334
Gas sold per lamp, cubic feet	19,546	19,891	20,403	20,218	19,653	19,003
Total gas sold, 1,000 cubic feet	4,629,539	4,574,864	4,725,152	2,720,601	2,687,586	2,714,409
" " " per mile main, 1,000 cubic feet	5,625	5,505	5,605	5,398	5,188	5,141
Gas used by company, 1,000 cubic feet	39,634	42,523	41,995	31,365	30,654	31,156
Gas unaccounted-for	200,803	221,249	219,770	127,307	139,427	151,424
Gas sold, per cent. of make	95.06	94.55	94.75	94.49	94.05	93 70
Gas used by company, per cent. of make	.82	.88	.84	1.09	1.07	1.07
Gas unaccounted-for, per cent. of make	4.12	4.57	4.41	4.42	4.88	5.23
Maximum send-out for 1 day, 1,000 cubic feet	25,123	23,275	23,919	15,201	16,419	18,285
Maximum day send-out, per cent. of total make	.515	.48	.48	.529	574	.632
Receipts from gas sold only	$3,121,408.93	$3,101,920.04	$2,972,655.33	$1,265,703.88	$1,174,259.71	$1,044,061.41
" " " " per 1,000 cubic feet	.6742	.6781	.6290	.4652	.4370	.3845
Meter rental	.0000	.0000	.0000	.0229	.0239	.0247
Stove rental, per 1,000 sold	.0070	.0073	.0018	.0028	.0030	.0032
Coke, per 1,000 sold	.0658	.0735	.0748	.1173	.1218	.1179
Price of coke, per ton	1.8322	1.9689	2.1172	2.5864	2.6332	2.5853
Tar and ammonia, per 1,000 sold	.0541	.0628	.0586	.0930	.1025	.0993
Total receipts for residuals, 1,000 sold	.1199	.1363	.1341	.2103	.2243	.2178
Total inc. less public lamp charges, per 1,000 sold	.8016	.8226	.7656	.7065	.6917	.6325
Taxes, per cent. on corrected capital	1.77	1.9	2	2.5	2.41	2.01

TABLE XI.

	Manchester.			Sheffield.		
	1902.	1903.	1904.	1902.	1903.	1904.
Manufacturing Charges.						
Coal and oil	.3565	.3025	.2761	.2320	.2064	.1864
Credit for residuals	.1199	.1363	.1341	.2103	.2243	.2178
Net cost coal	.2366	.1662	.1420	.0217	.0179	.0314
Salaries	.0051	.0055	.0051	.0055	.0057	.0061
Wages	.0500	.0474	.0453	.0545	.0523	.0533
Purification	.0109	.0081	.0093	.0105	.0087	.0079
Wear and tear	.0729	.0739	.0833	.1082	.1013	.0873
Total manufacturing charges, plus net coal	.3755	.3011	.2850	.2004	.1680	.1546
Distribution Charges.						
Salaries and wages	.0226	.0239	.0247	.0091	.0109	.0107
Wear and tear	.0259	.0219	.0265	.0282	.0199	.0257
Meter repairs	.0241	.0245	.0211	.0111	.0115	.0128
Stove repairs	.0049	.0071	.0103	.0047	.0049	.0055
Total distribution charges	.0775	.0774	.0826	.0531	.0472	.0547
Management Charges.						
Directors and auditors	.0000	.0000	.0000	.0028	.0030	.0038
Salaries	.0047	.0049	.0051	.0069	.0073	.0075
Collectors' commissions	.0093	.0097	.0093	.0055	.0061	.0055
Other charges	.0042	.0048	.0046	.0045	.0041	.0034
Total management charges	.0182	.0194	.0190	.0197	.0205	.0202
Rents payable	.0026	.0028	.0028	.0006	.0006	.0006
Rates and taxes	.0435	.0478	.0513	.0401	.0411	.0330
Law and parliamentary	.0000	.0000	.0000	.0004	.0006	.0006
Bad debts	.0014	.0012	.0010	.0016	.0016	.0020
Superannuation and other charges	.0004	.0000	.0006	.0020	.0016	.0047
Total working expense, plus net coal	.5191	.4497	.4423	.3197	.2633	.2390

Note.—All of the above data are figured on the basis of per 1,000 cubic feet sold.

TABLE XII.

	Manchester.			Sheffield.		
	1902.	1903.	1904.	1902.	1903.	1904.
Net cash rental	.6742	.6781	.6290	.4652	.4370	.3845
Meter rental	.0000	.0000	.0000	.0229	.0239	.0247
Stove rental	.0070	.0073	.0018	.0028	.0030	.0032
Rents receivable—miscellaneous receipts	.0004	.0008	.0006	.0053	.0034	.0022
Total receipts	.6816	.6862	.6314	.4962	.4673	.4146
Total expenditures	.5191	.4497	.4423	.3179	.2633	.2390
Gross profit	.1625	.2365	.1891	.1783	.2040	.1756
Annuities and interest on loan capital, less credits	.0464	.0464	.0425	.0028	.0034	.0032
Exceptional charges	.5004	*.0012 cr.	.0000	†.0045 cr.	†.0045 cr.	†.0049 cr.
Additions to funds out of profit	.0083	.0772	.0229	.0000	.0000	.0000
Total charges out of gross profit	.0551	.1224	.0654	.0017 cr.	.0011 cr.	.0017 cr.
Gross profit	.1625	.2365	.1891	.1783	.2040	.1756
Charges out of gross profit	.0551	.1224	.0654	.0017 cr.	.0011 cr.	.0017 cr.
Net profit	.1074	.1141	.1237	.1800	.2051	.1773

* Heavy figures, gas supply. † Interest on reserve. *Note.*—All the above data are figured on the basis of per 1,000 feet sold.

A Plea for Cement Joints for Street Mains.

By MR. W. MUSGRAVE WOOD.

Many months ago I noticed an article in the JOURNAL that after a short trial cement joints had been condemned as not being permanently tight by certain people. As the Company with which I am connected has been using cement joints exclusively in some districts, and has found them perfectly satisfactory, it occurred to me that the aforesaid experience was probably unique.

If the cement joint is properly made and carefully treated, until finally filled in, there is practically no chance of a resultant leak.

As little yarn and as much cement should be used as possible, for the yarn materially weakens the joint. The tightness of the joint depends upon its ability to withstand the effect of strains caused by the temperature changes. In order to determine about what was the variation of temperature at 3 feet below the surface at the latitude of Philadelphia, numbers of recording thermometers were buried at different depths, and the maximum summer and minimum winter readings gave an average variation of slightly under 50° F. for 3 feet depth. This change will cause the pipe to contract or expand .040 inch for every 12 feet length of pipe; the co-efficient of expansion for cast iron being .00000556 (from "Kent"). The cement joint being absolutely rigid it will not allow for this contraction, and consequently has to stand the strain necessary to stretch the length of pipe the same amount.

Referring to "Kent" again, I find the modulus of elasticity of cast iron, for about 4,000 pounds per square inch, is 15,000,000, therefore, the force to counteract 50° variation of temperature is 4,170 pounds per square inch. From this I have deduced the following table:

Size of Main. Inches.	Thickness of Wall. Inches.	Sectional Area of Pipe. Square Inches.	Total Force Required to Stretch Pipe. Pounds.	Depth of Cement Joint Inches.	Area of Cement. Longitudinal.	Shearing Force per Square Inches of Cement.
6	½	10	41.700	3	66.0	632
12	¾	25	104.250	3	124.5	837
16	⅞	33	137.610	3½	175.5	784
20	1	49	204.330	3½	209.6	975
30	1⅛	85	344.450	3½	350.0	984

I have been unable to get any figures on the tensile strength of cement joints. The only case that I know of was a 6-inch joint which was weighted with 8,000 pounds without having any effect upon it.

"Kent" gives the compressive strength of cement at:

10 days..... 2,910 pounds per square inch.
20 " ..... 3,342 " " "
30 " ..... 3,724 " " "

The tensile strength being:

10 days..... 376 pounds per square inch.
20 " ..... 420 " " "
30 " ..... 451 " " "

From the nature of a joint with the bead and lead groove, it is quite evident that the tensile strength of a cement joint is much nearer the compressive strength of cement than the tensile strength as given above; therefore, after the joint has once had a chance to set properly, there is little likelihood of it leaking from outside disturbances.

Our chief difficulty has been with large joints. Any size below 16 inches diameter is made up and allowed to set over night, and when tested, we never expect to find any trouble; but with 16, 20 and 30-inch pipe, it takes considerable care to make the joints hold the 3 pounds test which we place upon them after 24 hours' setting. The following are the reasons for leaks occurring on new work: First, badly mixed cement; second, settlement of blocking; third, poor driving on the second strand; fourth, variation in temperature.

The cement should be mixed just as stiff as the men can work it; about 4 parts cement and 1 part water by volume. It should be thoroughly mixed and only one joint full at a time. The blocking under the pipe should be ample. Our practice is to use two 3-inch by 12-inch by 12-inch spruce blocks under each 6-inch length, and four 4-inch by 12-inch by 30-inch spruce blocks under a 30-inch pipe, with a gradual variation for the intermediate sizes. The blocks should be placed upon an even, original bottom and settled in place with a rammer. As the second strand of yarn is the keystone of the joint, it should be driven back into place, the harder the better, making a very intimate contact between cement and iron, and also driving out all the air bubbles.

Last, but most important, is the question of temperature. The pipe should be kept as near an even temperature as possible. In order to accomplish this, we place boards over the ditch at about 2 A.M., when the pipe is coldest. The joints are then made up between 5 A.M. and 8 A.M., uncovering each joint just long enough to make it up. After replacing the boards about 6 inches of dirt is placed upon them, and as long as the sun is shining in the ditch the dirt is kept sprinkled with water. At no time is the sun allowed to strike the pipe at all after the joint is made. Even the final filling is done early or late in the day.

As I have said before we have been making cement joints, specials, and all in this district for over 2 years, and have had no trouble from any of our work after passing the first test of 3 pounds, while some of our large 24 and 30-inch lead joints in pumping mains have to be overhauled regularly every winter. With a pressure of 20 to 40 inches of water the annular contraction of the pipe causes a very heavy leakage.

In comparing the costs of lead and cement joints I have very little data, except for 16-inch pipe. Taking the average of a day's work on cement joints, I found that the labor, at 22½ cents an hour, cost 17 cents per joint, while, when making up lead joints, the cost was 38 cents per joint including all the labor. The material required to make a 16-inch cement joint is .73 pounds yarn and 3.07 quarts of cement, while lead joints require 32 pounds lead and 1.56 pounds yarn.

Cement at $4.50 per barrel will cost 4 cents per quart; yarn is worth $.039 per pound and lead 5 cents per pound. These give the comparative costs as follows, for 16-inch pipe:

Lead Joint.		Cement Joint.	
Labor	$ .38	Labor	$ .17
Yarn	.061	Yarn	.029
Lead	1.60	Cement	.122
	2.04		.32

Shop Talks on Gas Engines.

By "G. D. R."

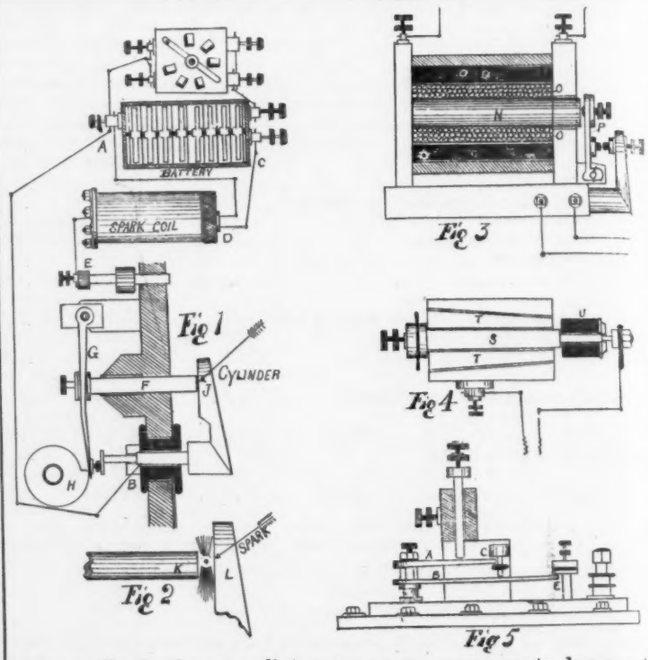
If you were to go into the stonecutter's establishment where there are various forms of engines in use for operating polishing and other machines, or the metal works where various independent engines are employed for operating special tools, or the wood-working, or in fact any kind of an industrial institution, you would hear many varied remarks concerning the gas engine and the electrical engine. You will find men who claim advantages and disadvantages for both. In this article I do not intend to tell of the merits or advantages of any particular type of gas or electrical engine. No matter how much a superintendent may prefer an electrical power for the service in his establishment, there are reasons why he may require the gas engine; he may be

remote from the required electrical power station. Therefore, he must have a gas engine for work which cannot be done with the regular steam engine or water wheel. Then, again, a man preferring the gas engine finds it to his advantage to use the electrical engine at times; and so it goes. In visiting a number of establishments using both gas and electrical engines, I found cases in which the gas engine was at a dead stop. "She stopped short," one man said to me, as he pointed to a gas engine. He had tried to get the engine running, and his workmen had also tinkered and adjusted. They would make the thing go a little while and then she would "buck." I found so many kindred instances, all due to some trivial defect, that might have been restored to order by the turn of a monkey wrench or a screwdriver, that I think it will pay to take a look at the particular parts of the gas engine that create trouble in shops where the mechanism is not fully understood. Figure 1 is a general sketching of the working mechanism of the gas engine, in which the firing of the charge of gasoline or gas and air depends upon an electrical spark. The process of primary ignition is shown. The battery is located, as indicated, above the cylinder or at some convenient point for access with wires as shown. The spark coil is located where the wire connections can be made to advantage. This coil consists of a series of turns of insulated copper wire on a soft iron core. The current passes from the battery through this spark coil by the wire connection *E D*. Thence the current passes to the engine frame by means of the post *E*. From this point the current passes to the electrode *F*, to the insulated electrode *B*, and back to the battery at *A*.

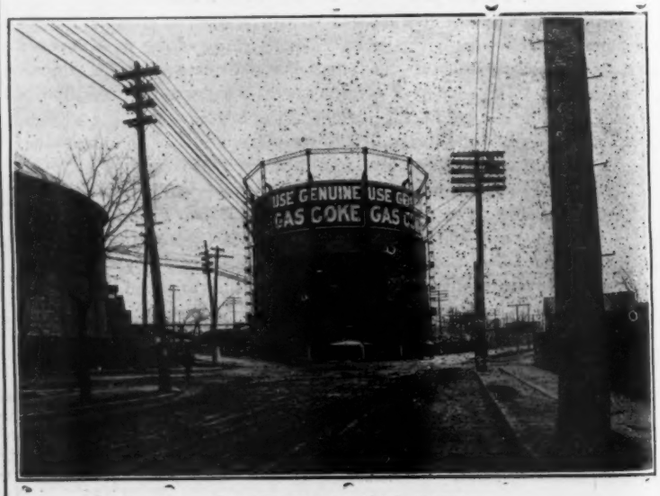
The electrode *F* is known as the "movable one." Sometimes this shaft gets sprung or worn and trouble results. I find that some of these movable electrodes get spoiled by constant wear. The substitution of a new one will usually overcome the difficulty. The insulated electrode below is so-called because of the hard rubber, porcelain or stone insulation employed. Sometimes mica is used. This insulation is shown in dark portion. A defective insulation may be your trouble, or perhaps the electrode does not fit correctly. I saw one electrode arm so sprung out of shape that the sparking was very irregular. A cam shaft is employed and the cam itself is shown at *H*. This cam operates the flat spring *G*. This flat spring is bolted to the end of the movable electrode as exhibited. Thus the movable electrode is shifted back and forth in accordance with the operation of the "snap" end of the cam. We show the snap of the cam pushing the flat spring forward, hence the end of the movable electrode inside the cylinder contacts with the arm *J* of the insulated electrode and the circuit for the current is completed. The cam continues to turn and shortly drops off the end of the flat spring. The pressure of the spring ceases on the movable electrode; the latter moves off from the arm at *J*. The sudden break in the current creates an electrical spark of ample power to ignite the gases. Fig. 2 illustrates the spark, generated between the end of the movable electrode *K*, and the arm of the insulated electrode *L*. There are also troubles with coils in the jump-spark system, and we show the construction of one of these coils in Fig. 3; *N* is the iron core, which is wound, first, with coarse wire, about number 18, and ultimately with fine wire, about 36. This portion is marked *OO*, and is shown in sectional view. The feature we call attention to is the timer. This is similar to the trembler of a common electrical door bell. It is the contact maker. It is not exactly as difficult to manage as the mechanism of a watch, but should be treated with equal care. The part is marked *P*. I would examine the bearings and adjusting screws at intervals. All parts should be free from lint and waste. As the circuit is made and broken at this point, special care is needed of the parts. In Fig. 4 is shown an interior view of the spark plug used in connection with this style of igniting device. This is a steel body shown for the exterior, and a brass core *S*, with the usual rubber or porcelain insulation *TT*, between. The insulation is also shown in black at *U*. This plug is screwed into the cylinder head. The arrangement of the wires at the binding posts is shown.

In Fig. 5 is a drawing of a form of vibrator sometimes employed in the jump-spark system. The breaking of the circuit must necessarily be quick, and in this device the result is brought about by an independent vibrator spring striking against the contact spring. This arrangement is on a rubber base and the rubber base is fastened to a wood foundation; the hammer spring is designated *B;* the contact spring is *A*; a stud is adjusted at *C*; a magnetic composition in the form of a core is adjusted just below and the vibrator spring is put in motion by the attraction of this magnet. When the circuit is closed, the spring *B* is attracted downward from *E* by the action of the magnet. Considerable velocity is obtained before the contact is made with spring *A*, resulting in a broken contact like a quick blow, producing the necessary spark for ignition.

I find obstructions to the effective work of igniters in the form of gummy oils, hard greases, lint, worn parts, sprung parts, loose nuts and screws, fractured bearings, etc. I have seen discarded gas engines restored to effective working order by repairing one part in a few minutes. Rust sometimes collects and corrodes unattended parts and irregular sparking arises.



The Picture Tells the Story.



Grand Rapids Gas Light Company.

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, Nov. 10th, 1905.

The Value of the Question Box.—The Optical Lantern as an Aid to Business.—The Photographer of the Technical Press.

One would like to see or to hear a really exhaustive discussion as to the advantages or the demerits of the Question Box department as applied in connection with Associations of Gas Managers. The subject has been considered (?) by more than one of our district associations but has usually been disposed of by a single speaker who has simply stated one or two points in connection with it. At a recent meeting of the Midland Association, Mr. George Helps, of Nuneaton, presented a short and informal report, concluding with the statement that, "He did not think that the Question Box as he understood it, as it had been put before him by those interested in it in America, would serve any useful purpose." No discussion followed this presentment of the report. Some of Mr. Helps' objections would be met by limiting the querists to members of a district association. For instance he considers that the framing of an answer requires some knowledge of the questioner, and illustrates his point by inferring that a "stoker" or a "council labor-

candidate" might be among the questioners. He also states that to ask a general question intelligently requires intelligence, and a man who asked a technical question generally required to have had some training in connection with the subject in which he desired to appear interested. With only the phraseology to guide him, and that possibly disguised by editorial re-arrangement, one can scarcely be expected to reply in an appropriate manner. Very often one saw questions that admitted of being answered in a hundred different ways. He also thought that the Question Box might be utilized as a medium for obtaining professional advice *gratis*, of a nature that in common fairness ought to be recognized by the usual fee. People usually had personal friends, and there were consulting engineers, while the technical press was always open to the discussion of any matters interesting to the profession, so the Question Box was not really wanted by the profession.

Much of this objection appears to apply to the abuse rather than to the use of the system, and a good deal of it is applicable to the reading and discussing of papers and the usual proceedings at Gas Manager's Associations. Mr. George Helps would probably be the last to support the old-fashioned notion of locking up the works and keeping everything connected with it as a kind of trade secret, but he apparently thinks that the pendulum is inclined to swing too far in the opposite direction, and that as a check on such unwholesome tendencies it is desirable to extinguish the Question Box. The avowed object of these Associations is to advance the knowledge of gas engineering and this object may be obtained by the intelligent application of the Question Box system. Persons who are competent to read or discuss papers are equally competent to propound questions or to write answers, even without any intimate knowledge as to the status of the questioner. As to the information getting into wrong hands, the same applies to the ordinary proceedings, which are published in exactly the same way as the Question Box, by means of reports issued to members, or through the technical press. Moreover a speaker in a discussion is more likely to give himself away during the excitement of debate, than while quietly writing a reply in the seclusion and leisure of his library or office. For these reasons I think that the idea is deserving of more consideration than it has yet received from the British gas associations.

While writing I happen to notice a report of the South East of Ireland Association which sets forth that, in connection with the Question Box, animated and vigorous discussions were the order of the day. From which it would appear that the department is capable of serving a useful purpose, especially in districts where the gas works are small and widely spaced. There are in Ireland and also in England many districts where there is not another gas works within walking or even driving distance, and it is the managers in these small and isolated places, who at times find themselves called upon to arrange and superintend every department, that find benefit from the question department. In this connection it may also be observed that the *Gas World* has been running a "Questions and Answers" column for some years, in which any number of questions from 2 to 6 appear weekly. Probably the only qualification required from a querist is that he shall be a subscriber to the magazine. Many of the questions submitted appear to be sufficiently intelligent and indicative of enough technical knowledge and interest to satisfy Mr. Helps. Sometimes the querists are evidently managers of small works seeking for knowledge respecting matters that do not often come into the range of their experience. And a good proportion relates to matters upon which the inquirer evidently holds a competent opinion, but on the principle of "many men many minds" desires to know what others think. Some of this class could perhaps be answered in a hundred different ways, and if so the 100 answers would be entertaining and instructive reading.

With the advancement recently made in photography the magic lantern acquires increased importance. At a recent meeting of the Midland Association of Gas Managers a very successful and novel feature was a lecture by Mr. Thos. Glover, Engineer and Manager of the Norwich works of the British Gas Light Company, illustrated by nearly 100 slides. The subject was the reconstruction of the two stations at Norwich, which are about half a mile apart and present the peculiar feature of one works cut into two pieces, the retorts, condensers and generating plant being on one site and the purifying, storage and distributing apparatus on the other. The lantern and slides probably cost less than a set of wall diagrams and enable a great deal more detail to be shown, and whereas the diagrams are only really legible to a limited number of the audience, the lantern pictures are visible all over the room, the occupants of the back seats getting perhaps a better effect than those on the front. As illustrating the spirit of the age, it may be observed that some of the views consisted of newspaper, magazine and bazaar catalogue advertisements that had proved successful. The importance of the assistance of a good showroom and a competent, energetic staff, were insisted upon in this connection.

Some people say that they cannot afford to advertise or even hold a local exhibition, but thanks to the enterprise of the *Gas World* the magic lantern provides a means of getting a cheap but effective advertisement. For a fee that is within the reach of all, the lantern and over 100 slides and manuscript of a lecture on the history, manufacture and uses of gas, can be had on hire. This is an excellent novelty for small country places, where evening entertainment during the winter is none too plentiful, and in larger towns a philanthropic manager or director would find that if he hired the apparatus for an evening, for the benefit of the gas works' staff alone, or including the gasfitters of the district, his action would be much appreciated, and he would probably be able to say, like the man who got a cheap seat at a high-class entertainment on behalf of a charity, that he had secured a return for his money, and that it is good business to give to a charity and get a full return.

In addition to the utilization of the photographic art in the reproduction of lantern slides it is now being largely utilized in the technical press, as an illustration in connection with new works, of apparatus disabled by disaster, or other interesting objects. Take the current issue of the *Journal of Gas Lighting* for example, as being a fair average number. The magazine comprises some 40 pages of letterpress, foolscap size, and the engineer in active practice who contrives to find time to read, mark and inwardly digest this mass of matter is indeed a prodigy. But in addition there are no less than 12 photographic reproductions, besides a 2-page diagram and reproduction of new patents. As illustrating the varied nature of this pictorial entertainment it may be mentioned that two views of a new retort house at Turin, four of a large new gasholder at Sheffield, one of two 3,000-light dry gas meters, five of new plant at the Reading gas works, and one of a machine that will take an even bite out of the side of a 10-inch main, and admit of the attachment of a full sized branch without interfering with the supply of gas, are included therein. A man may be too busy to read the letterpress but he can spare a minute to look at the pictures and thus attain an intelligent idea of happenings elsewhere. One can scarcely assess the value of the photographers' art in connection with the production of these illustrations, but it may safely be rated very highly. To the eyes of the general reader they are merely pictures interesting or otherwise from the artistic point of view only, but to the fully trained professional man they are a great deal more. A well selected position, such as all the above may well claim to be, enables the structural details to be recognized at a glance and one can readily imagine or follow out the why and the wherefore of each brick or piece of iron. Having looked through the *Journal* for Tuesday last, it is interesting to turn up one or two of the earlier volumes, in which the illustrations simply consist of one or two woodcuts. Perhaps this is the best way of showing the extent to which our technical press has utilized the aid of the camera.

But coming closer home than this, amature photography is becoming a popular pastime and the gas works staff probably includes a young man who has cultivated the hobby, or who would be willing to do so if encouraged. In a works of any size it is worth while to run a small photographic department. The advantage of a photograph as compared with a hand sketch is evident in the case of connection in the mains at corners of streets, or at the gas works, or of any piece of apparatus that is covered up underground. When carrying out important structural work, a series of views taken at daily or weekly intervals afford valuable information for future use. They can be readily arranged to show all the principal sizes and sections, and thus enable one to dispense with the very uncertain and treacherous assistance afforded by the memory of the oldest inhabitant, whose recollections are usually post dated. If a wall falls down he recollects that somebody always said it was not thick enough. But unfortunately he does not think anything of the matter until after the catastrophe.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

MR. M. E. MALONE, formerly of Denver, Col., will superintend the construction of the new gas plant for the Albuquerque (N. M.) Gas, Electric Light and Power Company. The new plant is to be at a convenient place opposite the Alvarado.

THE Omaha (Neb.) Gas Company is now seemingly free from legal entanglement to go on with the construction of its proposed new storage holder. The vessel is to be erected at the junction of Burdette and 22d streets.

SUPERINTENDENT LINTON says that the betterments on the plant of the Standard Gas Company, of Raleigh, N. C., will require an expenditure of not less than $20,000. The work is well underway.

MR. WM. H. ROBINSON, for many years in the service of the paymaster's division of the New Haven (Conn.) Gas Light Company, died at his home in East Haven the afternoon of the 16th inst.

MR. WM. DARBEE has resigned his position as Assistant General Superintendent of the Connecticut Railway and Lighting Company (his

headquarters were in Bridgeport) to act as engineering expert to the New York State Gas and Electric Commission.

THE new owners of the Wallingford (Conn.) Gas Light Company (the firm of Townsend & Son) announce that a reduction in the selling rate, from $2 per 1,000 cubic feet to $1.75 per 1,000 cubic feet, will become effective the 1st prox.

THE Gas and Electric Development Company, of Philadelphia, officially informs us of the sale of the Marshall (Mich.) Gas Light Company to Mr. Carrol Collins.

THE project to supply gas in White River Junction, Vt., by certain capitalists, at whose head is Mr. Alfred G. Law, of Philadelphia, does not seem to meet with the approbation of the proprietors of the Mascoma Electric Light and Gas Company, who have had a monepoly of the electric lighting of White River Junction for years, but who never saw fit to avail themselves of the right to operate a gas supply.

THESE "few lines" were recently forwarded by a correspondent in Denver, Col.: "With the plans going forward for the additional municipal lighting that will make Denver the real 'city of lights,' we should not overlook the fact that the business men were the first practical exponents of the new idea. Their displays of lights, almost countless now on the downtown streets, were the first practical step toward making the city beautiful with lights. They have practiced what we all have preached. The desire for lights for commercial purposes grew upon the business men almost imperceptibly, so they say. Before they knew it they found that lights were one of the most effective advertising mediums. Those who adopted the lights told of increased business, of an indescribable feeling of greater cordiality produced between merchant and patron. Their neighbors heard of this—they began to consider. The result is evident on every business street, and even into the residence sections and the suburbs. Drug stores, groceries and other smaller business houses far out from the heart of the city have their light signs, have their windows illuminated by numerous electric bulbs. It must be to the interest of them all or they would not continue the use of the lights. They benefit, the people benefit, because the lights form a pleasing break in walking through streets made more or less dark by the foliage. The 'City of Lights' soon will be a reality; one of the best that has ever befallen Denver."

THE actual purchaser of the Lebanon (Pa.) Gas Company, notice of the sale of which has heretofore been reported in this JOURNAL, is said to have been Mr. J. Craig Havemeyer, of New York.

THE regular semi-annual dividend of 2 per cent. on the shares of the Massachusetts Gas Companies is payable the 1st prox.

THE Rev. Mr. Whitmore, from the gas committee of the Stoneham Town Improvement Association, at a meeting of that body held some days ago, reported that the gas supplied to the residents was of fair quality, but he thought the price charged therefor was in excess of a reasonable one. The supplier is the Peoples Gas and Electric Company of Stoneham, and the average selling rate is $2 per 1,000 cubic feet. The highest rate is $2.50.

"REFERRING to your note in the last issue of the JOURNAL, respecting the petition of the Amherst (Mass.) Gas Company to the Board of Gas and Electric Light Commissioners for the right to supply electric currents in the town of Pelham, let me say that the main consumer on the line (in fact the line is to be constructed for the especial purpose of supplying that plant) will be the Montague Rod Company.—F. R."

ADVICES from Winnipeg, Manitoba, under date of the 16th inst., state that letters patent have been issued, incorporating Messrs. Daniel D. McTavish, Jesse C. King, both of St. Catharines, Ontario; Robert Allan Wyllie, of Winnipeg, and John Wooton and Robert J. Chalmers, of Manitou, under the name of "Mainton Gas Company, Limited," for the purpose of manufacturing gas for light, heat and power purposes, in the village of Maniton, Winnipeg and vicinity. The Company is capitalized in $75,000.

ON the ground that he is a patron of the Richmond (Ind.) Natural Gas Company, hence interested in the outcome of the legislation, Judge Henry C. Fox has announced that he will not preside during the hearing of the city's suit to enjoin the Company from putting its selling rate at 50 cents per 1,000 cubic feet. Judge Macy, of the Randolph county circuit court will conduct the hearing, which will be called the first prox.

AT the annual meeting of the Madison County (N. Y.) Gas and Electric Company, of Oneida, the Directors elected were: Messrs. Lawrence Barnum, Frank D. Pavey and Leonard Snider, of New York; Allen P. Stevens, John W. P. King and Alfred Harrison, Providence, R. I., and Harrison W. Coley, of Oneida.

"R W. P.," writing from Lynn, Mass., under date of the 20th inst., incloses the following respecting some recent improvements on the plant of the Providence (R. I.) Gas Company: "The big holder of the Providence Gas Company in South Providence was put in service upon the completion of the pumping station a few days ago. For 2 years there has been little or no reserve storage capacity, and while the new holder was being constructed, the old holders and the manufacturing plants were worked at nearly the peak of the load. The additional facilities afford assurance of uninterrupted supply for some time, but the demand for gas is increasing so rapidly that plans for a new manufacturing plant are being prepared, the old works at Globe street and Allen's avenue having nearly reached the limit fixed by the engineers. The necessity of enlargements was obvious 2 years ago and the Company purchased about 40 acres of land, fronting on tide water at Sassafras Point a short distance north of Field's Point. It was announced when the deeds were signed that the plant at Globe street would not be enlarged and that all improvements would be made on the Sassafras Point location, where there seemed to be room enough for the next 50 years. The big holder, however, is independent of the Sassafras Point plans in that gas can be pumped as readily from the new works as from the Globe street location. The recently completed power house is on the east side of the new gasholder. It is 38 feet long and 35 feet wide; it is of pilaster and panel face design and is trimmed with granite having a rock face finish, and the roof has gable or parapet walls. Fire walls divide the building into 4 parts—the boiler room, the governor room, the engine room and a place for storing fuel. In the boiler house are two 100-horse power Babcock and Wilcox boilers, with pumps and water heaters. The engine room contains 2 gas exhausters, each capable of pumping 160,000 cubic feet of gas per hour. Each exhauster is coupled direct to a 40-horse power vertical steam engine of modern pattern, and mounted on the bedplate with the exhauster. This machinery is used for pumping the gas from the manufacturing stations as it is made and delivering tt into the new holder, which has a storage capacity of over 4,000,000 cubic feet. Several automatic safety devices in connection with this machinery are actuated by electrical, hydraulic and gas pressures. The room is lofty, light and of very neat and substantial finish, the floor and woodwork being finished in oil. The governor room is 15 feet 8 inches wide by 27 feet long, and is used exclusively for the gas governor. The fuel room is 19 feet 6 inches wide by 27 feet long by 20 feet high, and adjoins the boiler house. It has the latest appliances for the economical handling of fuel. The new holder and pumping station receive all the gas made at both the manufacturing stations, and from this holder the gas is delivered into the holder at the north station, and from that point to the various holders throughout the district at even and undisturbed pressure."

THE Detroit *News*, of the 15th inst. says, that at a meeting of the Detroit City Council, held the night before, a communication was received from the Detroit City Gas Company, placing before the Aldermen a proposition for giving the city 80-cent gas, as outlined in the *News* some days ago. The Gas Company is not asking for any extension of its franchise at this time, which runs until 1923; but in return for the concession in rates it desires that several amendments be made thereto. The franchise, as it stands, provides for 80-cent gas when ever the sales of the Company in any one year shall reach a total of 800,000,000 cubic feet. The proposition of the Gas Company is briefly as follows: The new rates on gas shall be 90 cents gross and 80 cents net, for both fuel and illuminating use, the present price of fuel gas. In return for this lower rate on illuminating gas, the Company desires permission to fix a sliding scale of prices under this maximum, based on the amount of gas used; to be relieved from the necessity of making reports to the city on the amount of gas sold; to diminish the time in which the customer may take advantage of the net rate from 30 to 15 days, and to make a minimum charge of 50 cents per month for 5-light meters and under, with proportionately larger fees for larger meters. The communication was referred to the committee on franchises.

THE securities of the Michigan Light Company have been listed on the Columbus (O.) stock exchange. There are $1,250,000 of 6 per cent. preferred stock and $1,000,000 common stock. These stock issues are secured by the deposit of all the capital stock of the Jackson Gas Company, Kalamazoo Gas Company and the Pontiac Light Company. The report says that the underlying Companies supply a population of 64,000 with gas, and the Pontiac Company also does all the commercial electric lighting of that city. The Jackson Company has a perpetual franchise, the Kalamazoo Company franchise expires in 1916 and the Pontiac franchises expire in 1927 and 1929. The combined annual output of gas is 240,000,000 feet. Gross earnings, $443,002, and net, $214,953, for the year ending Sept. 30, last.

MR. C. H. FELLOWS, of Texarkana, Tex., has been appointed Superintendent of the San Angelo (Tex.) Gas Company.

MR GEORGE N. SMITH, Superintendent of the Citizens Gas and Fuel Company, of Oxford, Pa., says that the plant will be in operation by the first inst. About 125 services have been placed there and gas will be furnished free of charge from the time it is first made until January 1st, 1906. The plant was constructed in its entirety by the Western Gas Construction Company.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO., PROPRIETORS.

THOS. J. CUNNINGHAM, ELBERT P. CALLENDER, EDITORS.

CHAS. E. SANDERSON, MANAGER.

PUBLISHED ON EACH MONDAY OF THE YEAR AT
No. 42 Pine Street, New York.
Telephone, 2996 John.

TERMS:

SUBSCRIPTION—Three Dollars per annum, in advance. Single copies, 10 Cents.

THE JOURNAL is the official organ of the
NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.
AMERICAN GAS LIGHT ASSOCIATION.
WESTERN GAS ASSOCIATION.
OHIO GAS LIGHT ASSOCIATION.

NOTIFICATION RESPECTING ADVERTISING.

Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

MONDAY, NOVEMBER 27, 1905.

The Market for Gas Securities.

There is nothing of moment to report in connection with the city gas share market, unless it is to say that the demand for "underlying" gas bonds is persistent, and that values are advancing. Consolidated closed at 179 bid. Brooklyn Union maintains a fairly even rate in the gas share trading; and it certainly looks cheap at the named figures. The Laclede Gas Company has declared a 1¼ per cent. dividend on the common stock and the regular semi-annual dividend of 2½ per cent. on the preferred, both payable the 15th prox.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

NOVEMBER 27.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	179	180
Central Union, Bonds, 5's	3,000,000	1,000	108	110
Equitable Bonds, 6's	1,000,000	1,000	..	105
" 1st Con. 5's	2,300,000	1 000	118	120
Mutual	3,500,000	100	275	290
Municipal Bonds	750,000	..	..	..
New Amsterdam Gas Co. .. Bonds, 5's	11,000,000	1,000	111	114
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	37	43
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	..	98	104
Northern Union, Bonds, 5's	1,250,000	1,000	105	107
New York and East River .. Bonds 1st 5's	3,500,000	1,000	112	114
" 1st Con. 5's	1,500,000	..	106¼	108¼
Standard	5,000,000	100	140	160
Preferred	5,000,000	100	155	175
Bonds, 1st Mortgage, 5's	1,500,000	1,000	111	114
Yonkers	299,650	500	130	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	170	185
" " Bonds (5's)	15 000,000	1,000	113	115
Bay State	50,000,000	50	3/16	¼
" ncome Bonds	2,000,000	1,000	..	75
Binghamton Gas Works	450,000	100	..	65
" 1st Mtg. 5's	509,000	1,000	95	100
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000.000	1.000	47¼	50
Buffalo City Gas Co.	5,500,000	100	10	12
" " Bonds, 5's	5,250,000	1,000	75	80
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati Gas and Electric Co	29,500,000	100	104½	105
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	90	..
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	..	95
Preferred	3,026,500	100	107½	108
Consumers, Toronto	,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	85	.
Mortgage, 6's	3,600,000	..	..	118
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
" Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	..	..	100
Detroit City Gas Co	4,825,500	50	..	50
" Prior Lien 5's	5,603,000	1,000	..	98
Detroit Gas Co., 5's	381,000	1,000	75	80
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000		101
Essex and Hudson Gas Co.	6,500,000	..	39	40
For Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	..	110	112
" Bonds, 5's	10,500,000	..	110	110½
Indianapolis	2,000,000	..	60	70
" Bonds, 5's	2,650,000	..	104½	105
Jackson Gas Co	250,000	50	82	..
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	.	
Preferred	2,500,000	100	95	110
Bonds	10,000,000	1,000	108½	109
Lafayette Gas Co., Ind.	1,000,000	100	..	60
Bonds	1 000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison, Gas & Elec. Co. " 1st Mtg. 6's	350,000	1,000	106	108¾
" 6 per cent. scrip, due 1910	100,000	25	85	87
Montreal, Canada	2,000,000	100	218	218¾
Nashville Gas Lt. Co	1,000,000	100	110	..
Newark, N. J., Con. Gas Co.	6,000,000	..	56	58
Bonds, 6's	4,600,000	..	137	138
New Haven	2,000,000	25	200	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	101¼	101⅝
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	.
Rochester Gas & Elec. Co.	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	104½	105¼
San Francisco, Cal.	15,800,000	100	58½	58¾
St. Joseph Gas Co. " 1st Mtg. 5's	751,000	1,000	92	..
St. Paul Gas Light Co	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
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General Mortgage, 5's	2,465,000	1,000	96¾	..
Syracuse, N. Y.	1,975,000	100	50	55
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Washington, D. C	3,600,000	20	300	301¼
First mortgage 6's	600,000	..	..	..
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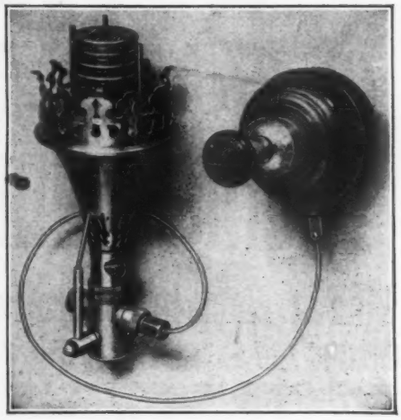

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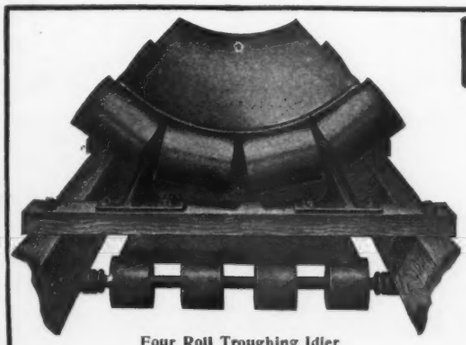

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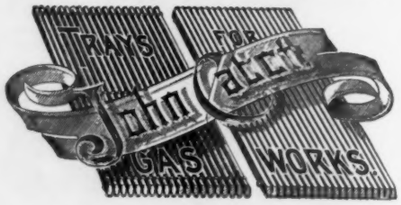

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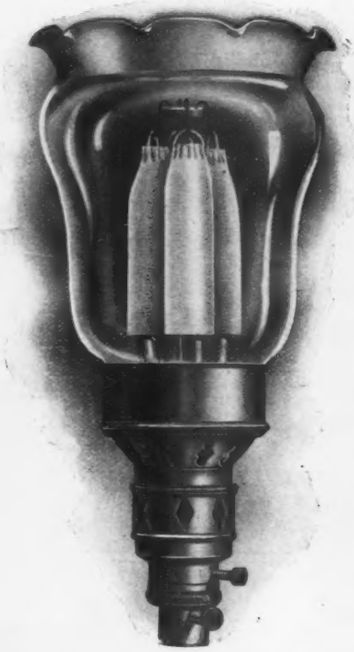

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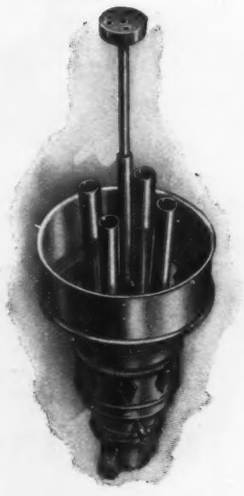

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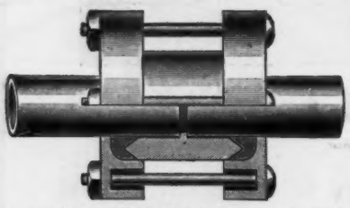

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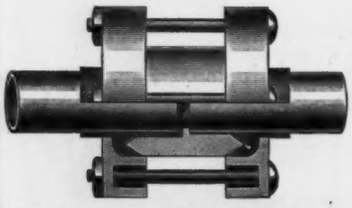

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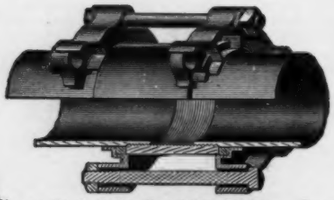

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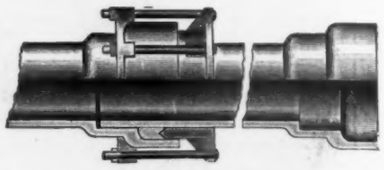

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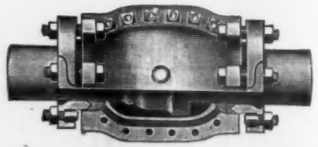

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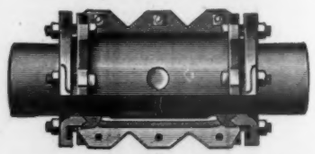

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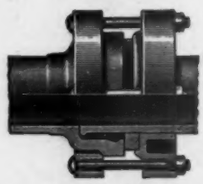

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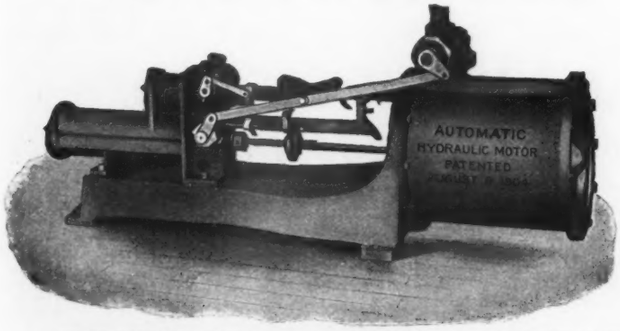

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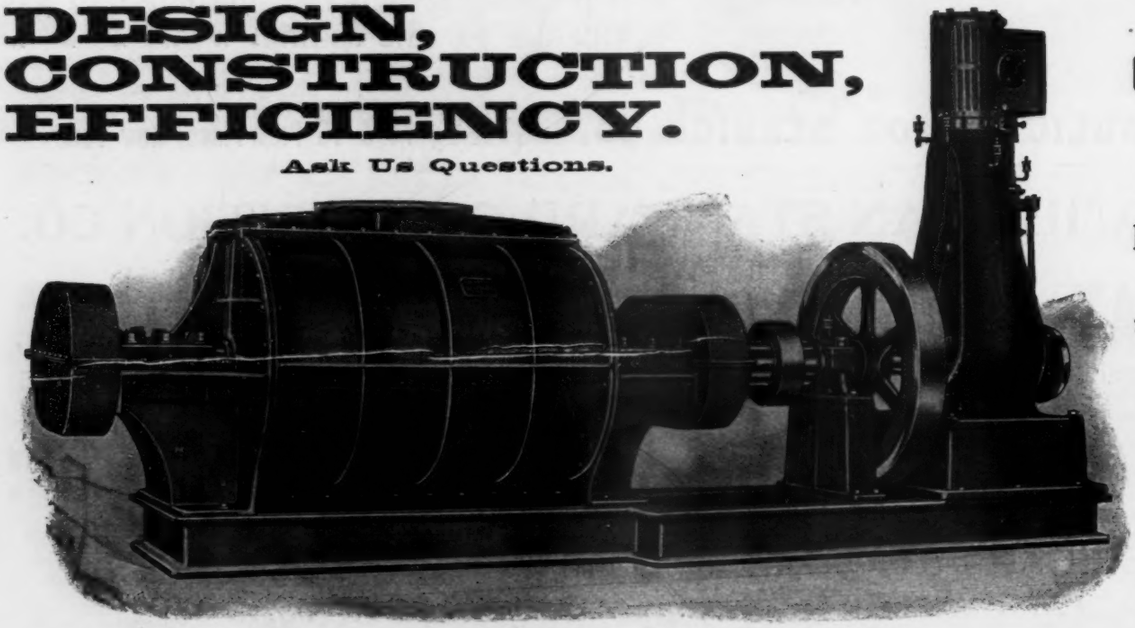

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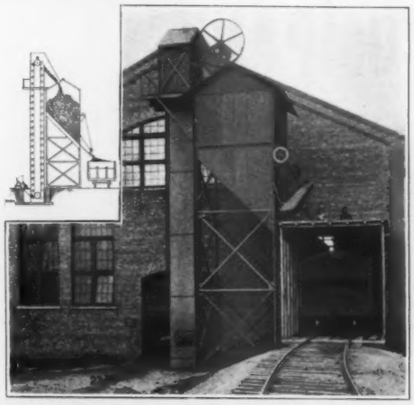

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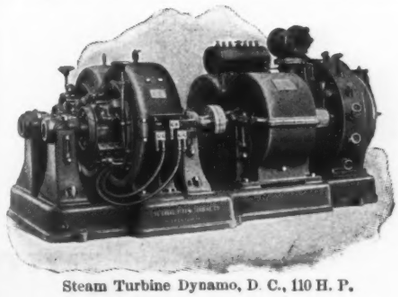

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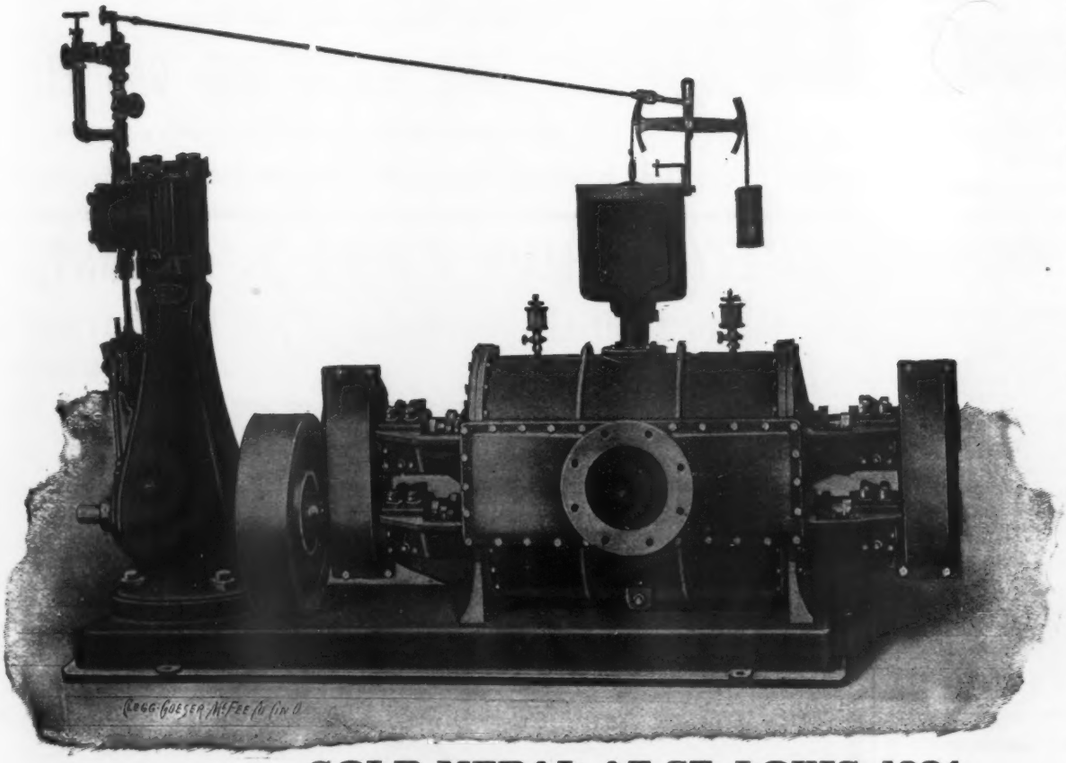

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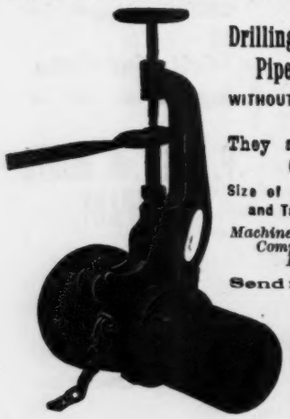

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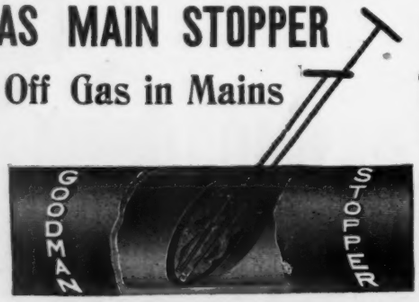
For Shutting Off Gas in Mains Temporarily during alterations and repairs.

Any size gas main can be shut off in 30 seconds.



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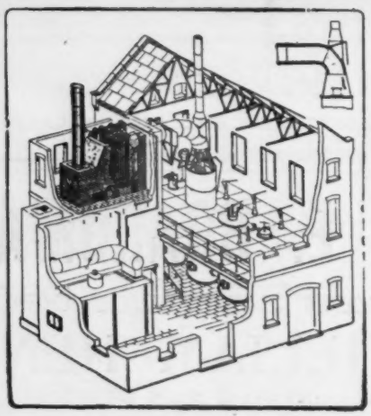

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Photometrical and Experimental Apparatus.

PUBLIC LIGHTING TABLE.

DECEMBER, 1905.

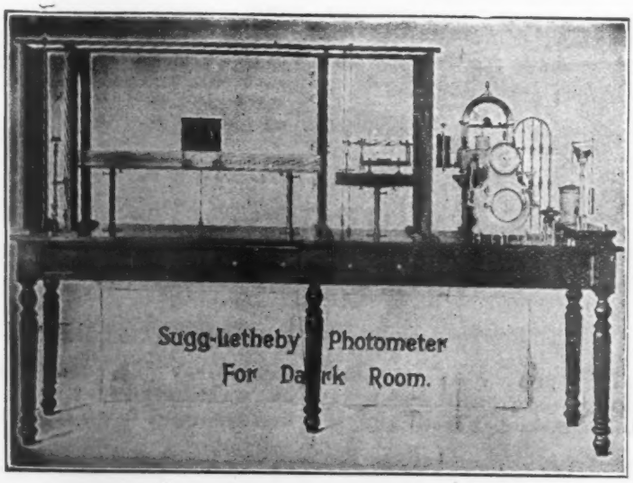
Table No. 1.
FOLLOWING THE MOON.

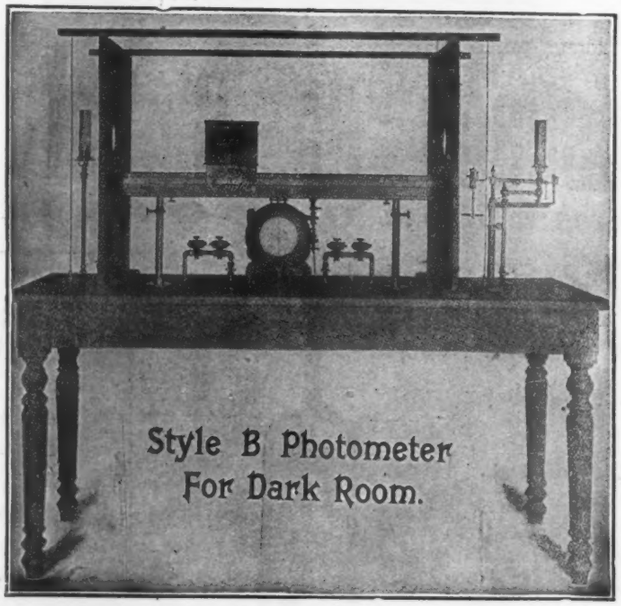
Day of Week.	Date.	Light.	Extinguish.
Fri.	1	9.00 PM	6.00 AM
Sat.	2	10.00	6.00
Sun.	3	11.00 FQ	6.10
Mon.	4	12 00	6.10
Tue.	5	12.50 AM	6.10
Wed.	6	1.50	6.10
Thu.	7	2.40	6.10
Fri.	8	3.40	6.10
Sat.	9	4.40	6.10
Sun	10	No L.	No L.
Mon.	11	No L. FM	No L.
Tue.	12	No L.	No L.
Wed.	13	5.00 PM	7.20 PM
Thu.	14	5.00	8.20
Fri.	15	5.00	9.20
Sat.	16	5.00	10.20
Sun.	17	5.10	11.20
Mon.	18	5.10	12.30 AM
Tue.	19	5.10 LQ	1.40
Wed.	20	5.10	2.50
Thu.	21	5.10	4.00
Fri.	22	5.10	6.20
Sat.	23	5.10	6.20
Sun.	24	5.10	6.20
Mon.	25	5.10 NM	6.20
Tue.	26	5.10	6.20
Wed.	27	5.10	6.20
Thu.	28	5.10	6.20
Fri.	29	5.10	6.20
Sat.	30	8.40	6.20
Sun.	31	9.40	6.20

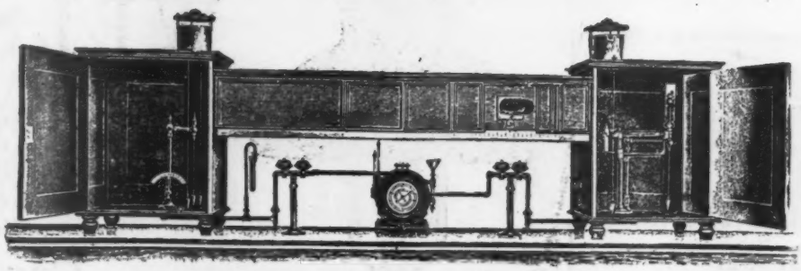
TOTAL HOURS DURING 1905.

By Table No. 1.

	Hrs.Min.
January	240.50
February	192.20
March	207.00
April	175.10
May	161.00
June	139.50
July	149.00
August	161.50
September	173.00
October	205.00
November	211.00
December	229.00
Total, yr.	2245.00







Closed Photometer For Light Room.

CIRCULARS SENT ON REQUEST.

PUBLIC LIGHTING TABLE.

DECEMBER, 1905.

Table No. 2.
NEW YORK CITY.
ALL NIGHT LIGHTING.

Day of Week.	Date.	Light.	Extinguish.
		P. M.	A.M.
Fri.	1	4.20	6.10
Sat.	2	4.20	6.10
Sun.	3	4.20	6.15
Mon.	4	4.20	6.15
Tue.	5	4.20	6.15
Wed.	6	4.20	6.15
Thu.	7	4.20	6.15
Fri.	8	4.20	6.15
Sat.	9	4.20	6.15
Sun.	10	4.20	6.20
Mon.	11	4.20	6.20
Tue.	12	4.20	6.20
Wed.	13	4.20	6.20
Thu.	14	4.20	6.20
Fri.	15	4.20	6.20
Sat.	16	4.20	6.20
Sun.	17	4.20	6.20
Mon.	18	4.20	6.20
Tue.	19	4.20	6.20
Wed.	20	4.20	6.20
Thu.	21	4.20	6.20
Fri.	22	4.20	6.20
Sat.	23	4.20	6.20
Sun.	24	4.20	6.25
Mon.	25	4.20	6.25
Tue.	26	4.20	6.25
Wed.	27	4.20	6.25
Thu.	28	4.20	6.25
Fri.	29	4.20	6.25
Sat.	30	4.20	6.25
Sun.	31	4.20	6.25

TOTAL HOURS DURING 1905.

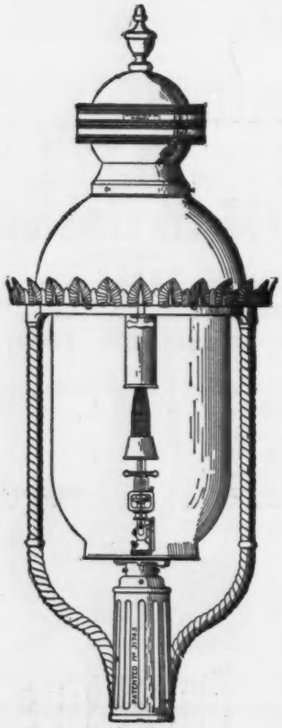
By Table No. 2.

	Hrs.Min.
January	423.20
February	355.25
March	355.35
April	298.50
May	264.50
June	234.25
July	243.45
August	280.25
September	321.15
October	374.30
November	401.40
December	433.45
Total, yr.	3987.45

NEW YORK, 97 Liberty Street. BOSTON, 814 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, Foot of Orleans Street. SAN FRANCISCO, 712 Polk Street.

WELSBACH STREET LIGHTING COMPANY

.... OF AMERICA ....



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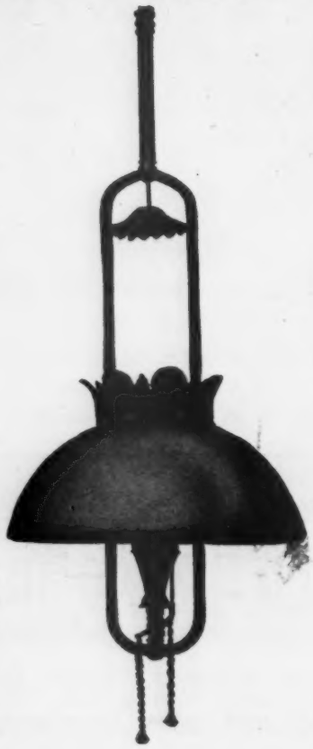

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TOTAL DAILY CAPACITY TO JULY 1ST, 1905, . 455,980,000 CU. FT.

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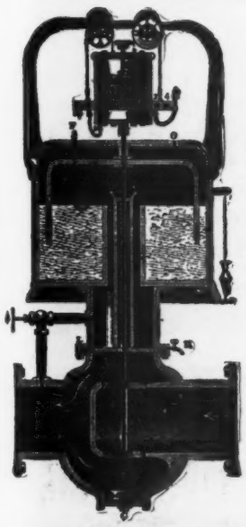

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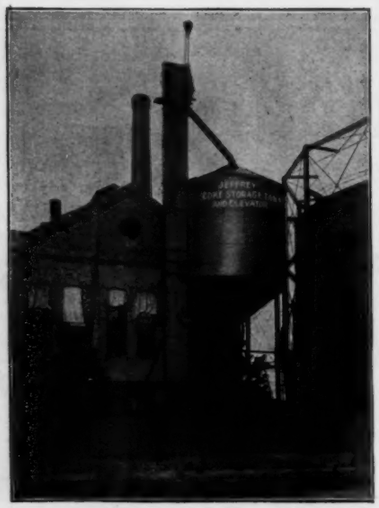

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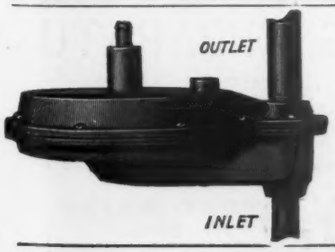

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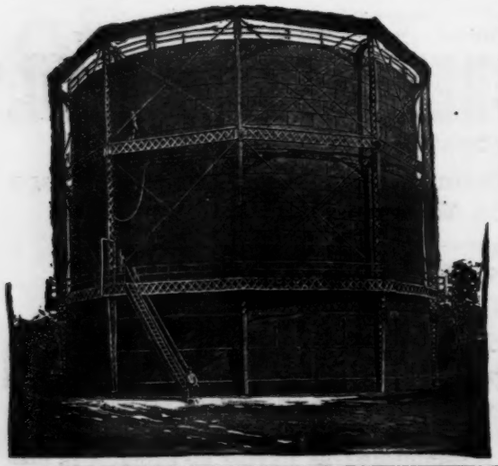

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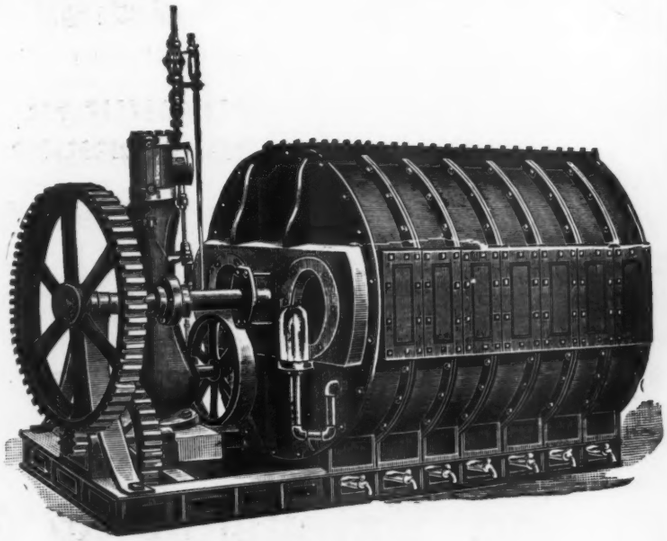

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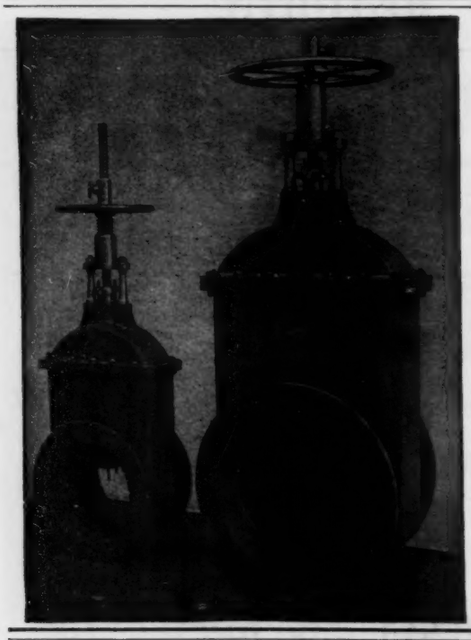

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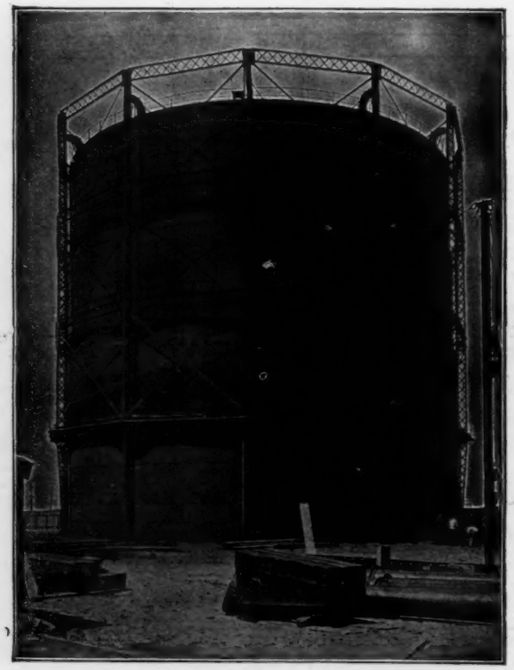

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